RESEARCH ARTICLE

▪ Vol. 5, No. 4 (Fall 2024)
▪ Pages: 198 – 212
▪ p-ISSN: 2791-0245
▪ DOI: 10.55737/qjssh.v-iv(CP).24273
▪ e-ISSN: 2791-0229

Open Access

QLANTIC JOURNAL OF SOCIAL SCIENCES AND HUMANITIES

Mediating Role of Cognitive Flexibility in the Relationship between Smartphone Addiction and Phubbing

Sana Abdul Qayyum [1] Asma Sikandar [2] Syeda Tafseer Zahra [3]

Abstract: *The widespread adoption of smartphones raised worries about addictive behaviours, especially smartphone addiction and phubbing. Contrary to prior research, the study aimed to investigate, phubbing as predictor of smartphone addiction, and determining the mediating role of cognitive flexibility in the association between phubbing and smartphone addiction. A cross-sectional survey was conducted among 255 participants (42% males, 58% females), aged 18 to 30 years. Data were collected using the Generic Scale of Phubbing (GSP) to measure phubbing, the Smartphone Addiction Scale-Short Version (SAS-SV) to assess smartphone addiction, and A New Measure of Cognitive Flexibility to evaluate cognitive flexibility. The findings showed a negative correlation between phubbing and cognitive flexibility and a positive correlation between higher levels of phubbing and increased smartphone addiction. The association between phubbing and an addiction to smartphones is partially mediated by cognitive flexibility, according to mediation analysis. Furthermore, there were no gender differences in cognitive flexibility or smartphone addiction, but there were notable gender differences in phubbing action, with men scoring higher than women. This study emphasizes the mediation impact of cognitive flexibility and the crucial importance of phubbing as predictor of smartphone addiction. Enhancing cognitive flexibility through interventions could be a useful strategy for reducing smartphone addiction and fostering young people's digital well-being.*

Key Words: Smartphone Addiction, Phubbing, Cognitive Flexibility, Digital Wellbeing

Introduction

The smartphone is among the most important technological developments of the twenty-first century. Smartphones have transformed from simple communication tools to multipurpose gadgets in the digital age, significantly impacting how people interact with their surroundings and other people (Ansari et al., 2017). They are crucial instruments for overcoming the challenges of modern living because of their ability to carry out a wide variety of tasks in a single gadget (Yang, 2016). The growing reliance on smartphones has raised concerns about their psychological and societal impacts. Global smartphone users surged to 3.7 billion in 2016, an 86.5% increase in seven years (Ash Turner, 2024). High adoption rates are evident in populous countries like China, with 974.69 million users, and India, with 659 million users. The United States ranks third with 276.14 million users, including 249 million active users (Howarth, 2023). Each day, individuals throughout the world use screens for an average of six hours and forty minutes (Backlinko Team, 2024). Since 2013, daily screen time has risen by 30 minutes. Users check their phones 58 times daily, with nearly 52% of checks occurring during working hours (Howarth, 2023).

The regularity with which people check their phones shows that smartphone usage can rapidly become compulsive, with data showing that 50% of all screen time sessions start within three minutes of the prior one (Mackay, 2019). The use of smartphones is growing in Pakistan as well. According to GSMA Intelligence, 80.5% of the population had mobile connections in January 2023. Between 2022 and 2023, Pakistan's mobile connection count rose by 5.9 million (+3.2%) (Kemp, 2023). These figures highlight the

[1] MS Scholar, Department of Applied Psychology, Riphah International University, Islamabad, Pakistan. Email: sanaaq345@gmail.com
[2] Assistant Professor, Department of Applied Psychology, Riphah International University, Islamabad, Pakistan.
[3] Assistant Professor, Department of Applied Psychology, National University of Modern Languages (NUML), Rawalpindi, Punjab, Pakistan. Email: tafseer.zahra@numl.edu.pk

▪ **Corresponding Author:** Asma Sikandar (asma.sikandar@riphah.edu.pk)
▪ **To Cite:** Qayyum, S. A., Sikandar, A., & Zahra, S. T. (2024). Mediating Role of Cognitive Flexibility in the Relationship between Smartphone Addiction and Phubbing. *Qlantic Journal of Social Sciences and Humanities*, 5(4), 198-212. https://doi.org/10.55737/qjssh.v-iv(CP).24273

global prevalence of smartphones and their impact on social interactions, communication, and information intake. Nevertheless, using a smartphone has a number of serious disadvantages in addition to its many benefits (Elhai et al., 2017). With the widespread use of smartphones in this day and age, interpersonal relationships have changed significantly (Gladden, 2018).

Two problems emerged with excessive smartphone use; phubbing and smartphone addiction. It has been demonstrated that these acts have a detrimental effect on social connections, which lowers the quality of relationships and face-to-face communication (Jan & Li, 2024)

These activities have effects on people's psychological health and general quality of life in addition to social interactions (Peleg & Boniel-Nissim, 2024). Mental health professionals are increasingly recognizing smartphone addiction as a serious concern, with nearly one-fifth of youth showing symptoms (Mutchler et al., 2011). Additionally, a study conducted in Pakistan's twin cities discovered that 60% (422 out of 702) of participants—57.3% males and 42.6% females—exhibited indicators of smartphone addiction, with a substantial link to social networking app usage (Khalily et al., 2021). Most studies focus on smartphone addiction's impact on phubbing, but the potential for phubbing to trigger or intensify addiction remains underexplored.

Studies have shown how common phubbing is and how it affects social dynamics, underscoring the need for a more thorough investigation into its psychological effects (Sun et al., 2021). Given that we use cell phones almost constantly in today's digital world, it is essential to comprehend the psychological processes that underlie our interactions with them (Nazir & Bulut, 2019). Given that we use cellphones almost constantly in today's digital world, it is essential to comprehend the psychological processes that underlie our interactions with them.

According to Martin et al. (1998), cognitive flexibility is the ability to identify many communication alternatives, adjust to changing situations, and have faith in yourself as a flexible person. While people with little cognitive flexibility have trouble controlling their emotions, thinking rigidly, and adapting to new conditions, individuals who have high cognitive flexibility are better able to deal with stress, social settings, and change (Koesten et al., 2009). Increased cognitive flexibility may result in more flexible smartphone use, which lowers the risk that phubbing will be brought on by smartphone addiction (T'ng et al., 2018). In order to guide solutions for better digital habits and well-being, this study investigates whether cognitive flexibility modulates the link between phubbing and addiction to smartphones.

Theoretical Framework

This study employs two interconnected theoretical frameworks to comprehend the complex interaction between phubbing, smartphone addiction, and the mediation role of cognitive flexibility: Cognitive Theory and Dual Process Theory.

Cognitive Behavioral Theory

Based on cognitive behavioural sciences, the cognitive behavioral theory emphasizes how behavior is influenced by perception and attention (Neisser & Becklen, 1975). Phubbing involves divided attention between smartphones and face-to-face interactions, influenced by cognitive processes (Sansevere & Ward, 2021; Tanhan et al., 2023). People with greater cognitive flexibility are better able to adjust to social dynamics, which is essential for adaptive behavior (Diamond, 2013). According to this paradigm, dysfunctional cognition and behavior patterns have a role in the emergence and maintenance of addiction (Bağatarhan & Siyez, 2022).

Dual Process Theory

Two cognitive processes are distinguished by the Dual Process Theory: the reflexive, automatic System 1 and the reflective, controlled System 2 (Evans & Stanovich, 2013). Smartphone addiction and phoning may include reflexive reactions, including checking the phone right away (Da Silva, 2023), but cognitive flexibility is in line with System 2, allowing for thoughtful control over smartphone use (Alexopoulou et al., 2020). Cognitive flexibility may mediate the relationship between phubbing and smartphone addiction,

influencing how individuals manage smartphone use in social contexts. This theory supports investigating both automatic and controlled processes in understanding these behaviors.

Literature Review

Phubbing

Chotpitayasunondh and Douglas (2018) define 'phubbing as snubbing someone in a social setting by focusing on a smartphone instead of the person. The person using the phone is the phubber, while the ignored individual is the phubee, and one can be both at once'.

It concluded phubbing ranks as one of the most prevalent health issues among students (Aygar et al., 2021). A study found that 52% of participants exhibited phubbing, primarily at home (52.9%) and in college (47.1%). Facebook and WhatsApp were the main platforms, and 35% phubbed 3-5 times daily for 30 minutes to an hour (Bala et al., 2020). Another study found that many students would prefer to avoid being phubbers after learning about its impact on academic and interpersonal environments (Gladys & Villalón-Hernández, 2023). The usage of smartphones during in-person talks has been explained by reciprocity, multitasking, and the satisfaction of immediate wants or desires (Al-Saggaf & O'Donnell, 2019). Gender moderated the effect of personal phubbing experiences on perceived norms (Chotpitayasunondh & Douglas, 2016).

The act of phubbing is shaped by societal norms, individual tendencies to withdraw, one's capacity to tolerate, and their ability to exercise self-control (Latifa et al, 2019). In addition, another study came to the conclusion that phubbing was less prevalent when person's mobile phone norms were strong (Schneider & Hitzfeld, 2019). An online study of 218 smartphone owners reported that the belief that others engage in similar behavior serves as the primary justification for phubbing (Leuppert & Geber, 2020). According to one study, phubbing and perceived social norms are mediated by personal control and FOMO (Li et al., 2021). People are more likely to phub friends and family than complete outsiders (Al-Saggaf & MacCulloch, 2019). Personality traits including anxiety and diligence, which together explain 7% of the variance, have also been found to have a significant impact on phubbing (Erzen et al., 2019).

Another study found that trait boredom predicts the frequency of phubbing (Al-Saggaf et al., 2018). According to research, neuroticism and diligence were significant predictors of phubbing behavior, accounting for 7% of the total variation (Erzen et al., 2019). Emotional intelligence and animosity were observed to predict phubbing tendencies (Parmaksız & Kılıçarslan, 2021). It was determined in another study that the individual-level elements impacting phubbing behavior are boredom, online vigilance, and intrinsic drive rather than sociodemographic factors or personality traits (Duradoni et al., 2023).

Machine learning predicts phubbing more accurately, suggesting that factors other than addiction dynamics, such as age, social anxiety, and owned ICT services, have a role (Rahman et al., 2021). Additionally, another conduct shared there are important psychological and sociological predictors of online compulsive behaviors associated with phubbing, namely trait and social anxiety (Guazzini et al., 2019).

A study conducted with an Indian sample found that there is a statistically significant relationship between phubbing and psychological distress (Bala et al., 2020). One more conduct revealed phubbing is a danger to one's mental health, causing anxiety and depression and negatively impacting relationships (Nagarajappa et al., 2020). Another research conducted to explore parental phubbing effects on children revealed that early phubbing by parents predicted problematic smartphone use in adolescents later on (Geng et al., 2021). A study deals with the drawbacks of phubbing including the development of addictive behaviors that are harmful to the person, but they also damage our social lives when they are constantly displayed in social situations (Bulut et al., 2019). A similar approach concludes phubbing and its effects cannot be disregarded because the intrusion and its consequences are so unacceptable in any relationship romantic, academic, or professional (Nazir, et al.,2019).

Smartphone Addiction

The definition of smartphone addiction in a study is 'A behavioral issue known as smartphone addiction also known as problematic or pathological smartphone use is defined by compulsive and excessive

smartphone use that interferes with day-to-day activities, employment, and interpersonal connections' (Roberts et al., 2014). According to Elhai et al. (2019), problematic smartphone use is the excessive or addiction-like use of smartphones in daily life that is accompanied by dysfunction and symptoms resembling those of a substance use disorder.

A similar study concluded that smartphone addiction frequently leads people to skip important tasks and commitments including work, education, and interpersonal relationships. Smartphone use may take precedence over in-person interactions for those who are affected (Kuss & Griffiths, 2017). Smartphone addiction can have adverse impacts on one's psychological wellness as well as increase anxiety, depression, and stress as well as decrease life satisfaction (Elhai et al., 2017). The American Psychiatric Association classified gambling as the first behavior to be classified as a non-drug addiction problem and urges more study of Internet gaming disorder. However, as of right now, neither the DSM-5 nor the ICD-11 mentions smartphone addiction (APA, 2013).

The results of a study highlighted that a significant proportion of the participants may have been unaware of their addiction to mobile phones, considering their constant use of these devices in their daily lives (Parasuraman et al., 2017). The consequent functional impairment in multiple domains establishes a strict standard for clinical assessment (Lin et al., 2016). Research suggests adding smartphone addiction disorder (S.P.A.D.) to the DSM's "Non-Substance Addiction" category, with criteria including over seven hours of daily use, preference for virtual over in-person connections, and using smartphones to cope with negative emotions (Tran, 2016). Some cell phone behaviors are more likely than others to result in dependence, and these tendencies vary by gender. Furthermore, an activity's propensity for addiction is not always indicated by the quantity of time spent on it (Roberts et al., 2014).

A lot of researches merge smartphone addiction with other tech addictions, making it unclear if the problem stems from the device itself or from its features. Additionally, most research excludes theoretical frameworks, which impairs comprehension. Clear definitions and the use of theories are urged for improved research (Yu & Sussman, 2020). Long-term aspects of smartphone addiction appear to be consistent with a drop in behavior-focused studies over time (James et al., 2023).

The study revealed a significant increase in the probability of sleep problems, depression, and anxiety among those with Problematic Smartphone usage (Yang et al., 2019). Smartphone addiction is one of the risk factors for inadequate sleep quality (Ozcan & Acimis, 2021). Excessive use of phones leads to a forward-tilted head posture, reduced cervical superficial muscle activation, and impaired joint position perception while bending the neck (Cetin et al., 2022). An additional study found smartphone addiction is an issue that correlates with conditions such as anxiety and depression (Nour et al., 2023).

Another investigation showed that depressive disorders, smartphone addiction, and neuroticism are significant factors that lower quality of life (Gao et al., 2017). The findings of additional research revealed that an addiction to mobile phones has a negative impact on the development of interpersonal connections (Choi & Kim, 2016). Social elements, most notably the function of cell phones in preserving relationships, are major contributors to the development of addiction (Chen et al., 2023). These factors caused a variety of effects on addicts, including shifts in their everyday lives, interactions with others, physical health, and psychological well-being (Han & Kim, 2019).

A study's findings point to a direct link between social media use, smartphone addiction, and fear of missing out (Li et al., 2021). According to one more conduct, there is a strong connection between personality traits and the emergence of smartphone addiction (Kim et al., 2016). The brain mechanisms behind smartphone addiction may provide information about features common to other brain-related diseases as well as those unique to them (Kim et al., 2019). The excessive use of cell phones may be driven by peer pressure and societal expectations. It is essential to manage smartphone addiction by taking into account both personal characteristics and external factors (Kim, 2021). Additionally, the impacts of conformity, leisure activities, and perceived happiness on smartphone addiction are modified by gender (Chen et al., 2017). In addition, one more investigation suggests, that cell phone addiction is strongly predicted by family functioning, and the relationship between the two is mediated by loneliness (Li et al., 2023).

Peer attachment influences the impact, both directly and through automatic thoughts, emphasizing the beneficial significance of peer relationships in forming the links between thoughts, mobile phone addiction, adaptability, and family cohesion (Lian et al., 2023). In addition, one more literature highlights, that a lower risk of developing a cell phone addiction is linked to higher levels of physical exercise (Yang et al., 2021). According to another investigation, both psychological (Cognitive behavioural therapy, Mindfulness Training) and physical (general aerobic exercise) therapies significantly improve Problematic Mobile Phone Use scores, according to interventional research. One more literature demonstrated Mindful Body Exercise is less effective than General Aerobic Exercise (Zhang et al., 2023).

Cognitive Flexibility

Cognitive flexibility is defined as the capacity to recognize different communication options, be adaptable to changing circumstances, and believe in oneself as a flexible person (Martin & Anderson, 1998). Cognitive flexibility is a crucial human quality (Ionescu, 2012). Another similar research finds the occurrence of a change or shift in the level of attention control or in the representation of a task that results in a modification of the strategy employed is the primary attribute of cognitive flexibility (Canas et al., 2006). Cognitive flexibility may be supported by brain dynamics and neural plasticity suggested by other literature (Dajani & Uddin, 2015).

Additionally, another similar investigation revealed that collaborative contextual signals in our surroundings, such as subconscious cues, can become linked to and activate cognitive flexibility (Braem & Egner, 2018). While some PFC domains focus on certain switch types, others provide broad switching operations. This demonstrates how our brain constructs itself according to the degree of specificity or abstraction needed for flexible thought (Kim et al., 2011). The results of one more investigation point to a potential function for the left ventrolateral prefrontal cortex in conceptual conflict resolution and flexible cognitive performance during task switching (Badre & Wagner, 2006).

As per the study's conclusions, individuals who have higher levels of cognitive flexibility also have better behavior and social skills. Stronger cognitively flexible individuals exhibit less problematic conduct (Stevens, 2009). Yet additional research suggests that more cognitive flexibility is correlated with increased social competence when interacting with peers (Ciairano et al.,2006).

It has been proven that increased aerobic activity frequency leads to improved cognitive function, particularly cognitive flexibility (Masley et al., 2009). The study included two groups: a meditation group and a control group that had no prior experience with meditation found that improvements in cognitive flexibility and process of attention are strongly linked to mindfulness (Moore & Malinowski, 2009). Cognitive flexibility is demonstrated by greater variation in action-tracking scores as a result of task parameters (Themanson et al., 2008).

Research postulates it is essential to target cognitive flexibility in interventions within the context of CHD (Cassidy, 2020). In addition, one more study suggests that individuals with lower cognitive flexibility might not consider cognitive restructuring as effective in reducing emotional discomfort as those with higher cognitive flexibility, so there is a need to consider cognitive flexibility (Johnco et al., 2014). Cognitive flexibility had a complete mediation impact on the association between pleasant emotions and insight problem-solving (Lin et al., 2013). An investigation revealed hopelessness and perceived stress are mediated by intolerance of uncertainty and cognitive flexibility (Demirtas, 2020).

According to the findings of a Chinese study, the addiction to social networking sites had a positive correlation with depression, and the relationship between the two was largely mediated by cognitive flexibility (Wang et al., 2023). Phubbing has been linked to a number of attention-related cognitive impairments, inattentiveness, difficulty shifting and being distracted, and frequent attentional lapses (Sansevere & Ward, 2021).

Conceptual Framework

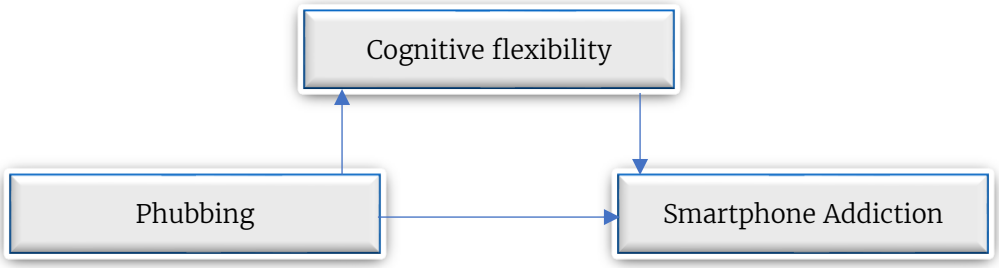
Phubbing refers to the act of ignoring others in favor of one's smartphone, which may have led to decreased social interactions and increased smartphone reliance (Chotpitayasunondh & Douglas, 2018). Excessive smartphone use that interfered with everyday obligations and activities and frequently had detrimental

psychological impacts was a hallmark of smartphone addiction (Roberts et al., 2014). The ability to recognize different communication options, adjust to changing circumstances, and have faith in one's ability to be flexible are all examples of cognitive flexibility (Martin & Anderson, 1998). The ability to recognize different communication options, adjust to changing circumstances, and have faith in one's ability to be flexible are all examples of cognitive flexibility (Martin & Anderson, 1998).

It was postulated that the association between smartphone addiction and phubbing was mediated by cognitive flexibility. In particular, people who had lower degrees of cognitive flexibility would have been more likely to get addicted to smartphones as a result of phubbing because they found it difficult to properly control their attention.

Figure 1

Showing how Phubbing, Smartphone Addiction, and Cognitive Flexibility are Related



Rational

In recent years, a lot of research has been conducted on the relationship between addiction to smartphones and phubbing behavior, primarily examining how smartphone addiction predicted the occurrence of phubbing (Chatterjee, 2020; Bajwa et al., 2023). To address a substantial information gap about their impact on social dynamics and personal well-being, the study explores the mutual interaction between smartphone addiction and phubbing. The study looks at how phubbing, smartphone addiction, and cognitive flexibility interact in order to improve theoretical understanding and guide focused treatments and preventative measures that encourage healthy digital habits.

Objectives

The objectives of the research are as follows:

1. To determine the predictive nature of phubbing for smartphone addiction among adults.
2. To examine the mediating role of cognitive flexibility between phubbing and smartphone addiction among adults.
3. To determine gender variation among the degree of cognitive flexibility, smartphone addiction, and phubbing among adults.

Hypothesis

A hypothesis was generated in light of previous literature to explore the relationship among cognitive flexibility, phubbing and smartphone addiction. The list of hypotheses is as follows:

1. Phubbing will act as a predictor of smartphone addiction among adults.
2. Cognitive flexibility will mediate the relationship between phubbing and smartphone addiction among adults.
3. There will be gender differences in study variables phubbing, smartphone addiction and cognitive flexibility among adults.

Methodology

Operational Definitions of Variables

Phubbing

Phubbing is the act of rejecting or withdrawing from direct social interactions with others by utilizing a smartphone or other mobile device. It is measured by utilizing the Generic scale of phubbing (GSP)

developed by Chotpitayasunondh & Douglas. The scale had excellent psychometric properties with α=0.88. The scale consisted of 15 items and assessed four factors: nomophobia, interpersonal conflict, self-isolation, and problem acknowledgement (Chotpitayasunondh & Douglas, 2018a). Items were answered on a 7-point Likert scale ranging from 1 (Never) to 7 (Always). Items within each Factor were summed and a mean score for each factor was computed; higher scores indicated greater feelings of subscale constructs.

Smart Phone Addiction

The 10-item SAS-SV, a trustworthy self-report scale (α = 0.967), was used to measure smartphone addiction, which is defined by its detrimental effects on social, psychological, and professional performance. The five domains assessed by the SAS-SV include daily-life disturbance, withdrawal, cyberspace-oriented connections, overuse, and tolerance. It was developed from the original Smartphone Addiction Scale (SAS) and verified by seven experts. A 6-point Likert scale was used to record responses, and the mean, standard deviation, and total scores were computed.

Cognitive Flexibility

The ability to adjust and transition between various cognitive tasks, viewpoints, or tactics in response to shifting environmental demands is known as cognitive flexibility. The 12-item self-report Cognitive Flexibility scale (α =0.83) was utilized on a 6-point Likert scale devised by M. Martin (Martin & Rubin, 1995). Items 2,3,5 and 10 were reverse coded then all summed up and the mean and standard deviation were determined.

Procedure

The study examined cognitive flexibility as a mediating factor between adult smartphone addiction and phubbing using a cross-sectional approach. Data were gathered using self-report questionnaires from a stratified random sample of 255 people (42% males, 58% females) between the ages of 18 and 30 in accordance with APA ethical criteria. In order to account for developmental differences in behavior and technology use, participants were divided into two groups based on Piaget's theory of cognitive development: emerging adults (18–22 years old) and young adults (23–30 years old).

Table 1

Frequencies and percentages of Demographic characteristics of Sample (N=255)

Variables	*f* (%)
Gender	
Male	108 (42.4)
Female	147(57.6)
Education	
Undergraduate	96(37.6)
Graduate	159(62.4)
Age	
Emerging Adults	123(48.2)
Young Adults	132(51.8)

Note: f= frequency, %=Percentage

Results

Quantitative data analysis was conducted using SPSS, with descriptive statistics (means, standard deviations, and frequency distributions) to summarize participant characteristics and variable scores. Mediation analysis using bootstrapping in Process by Hayes tested both hypotheses, evaluating the predicted nature of phubbing for smartphone addiction and the mediating role of cognitive flexibility in the relationship between phubbing and smartphone addiction. Gender differences in the variables were assessed using t-tests.

Table 1

Psychometrics Properties of Study Scales (N=255)

Scales	α	Ranges		Skew	Kur
		Potential	Actual		
Smartphone Addiction (Short Version)	0.82	10_60	10_57	-0.004	-0.217
Generic scale of Phubbing	0.90	15_105	15_99	0.005	-0.216
New Measure of Cognitive Flexibility	0.65	12_72	29_72	0.184	0.174

Note: α=Cronbach's Alpha, Skew=Skewness, Kur=kurtosis

Table 2 summarizes the psychometric features of the study variables. All three scales showed an acceptable range of alpha. Overall, the values of skewness and kurtosis are close to zero, indicating that the scores are distributed normally. This shows modest degrees of smartphone addiction and phubbing, as well as a small tendency for greater cognitive flexibility, most likely due to the positively skewed and leptokurtic distribution.

Table 2

Descriptive Statistics and Correlations for Study Variables (N=255)

Variables	1	2	3
Smartphone Addiction	_	.62**	0.02
Phubbing		_	-.18**
Cognitive Flexibility			_
M	32.96	49.1	80.32
SD	9.55	17.82	22.92

*Note:*** p< 0.01 level

The correlations between Phubbing, Cognitive Flexibility, and Smartphone Addiction are shown in Table 3, along with descriptive data (means and standard deviations). The mean values and standard deviations show moderate degrees of smartphone addiction and phubbing, as well as significant variations in cognitive flexibility among subjects.

A weak negative relation between phubbing and cognitive flexibility was presented by Pearson correlation which means that there is a relatively small connection between reduced cognitive flexibility and higher phubbing levels.

Table 3

The mediating role of Cognitive Flexibility between the relationship of Phubbing and Smartphone addiction (N=255)

Model	Variables	R^2	B	SE	t	p	95% CI (LB)	95% CI (UB)
1	Constant		50.9	1.35	37.69	.00	48.24	53.56
	Phubbing	0.03	-0.07	0.03	-2.78	.00	-0.12	-0.02
2	Constant		7.45	3.55	2.1	0.03	0.47	14.44
	Phubbing	0.4	0.34	0.03	12.87	.00	0.29	0.4
	Cognitive Flexibility		0.18	0.06	2.81	.00	0.05	0.31
Total Effect		0.38	0.33	0.03	12.4	.00	0.28	0.38
Direct Effect		0.4	0.34	0.03	12.87	.00	0.29	0.4
Indirect Effect			-0.01	0.01			-0.03	-.00

Note: For Model 1 F(1,253)=7.74, Model 2 F(2,252)=82.97, For total effect model F(1,253)=153.86

Table 4 represents mediation analysis and shows the partial mediating role of cognitive flexibility (M) in the relationship between phubbing(X), the independent variable, and the dependent variable smartphone addiction (Y). The direct effect (path c') of Phubbing on Smartphone addiction was significantly positive, while the total effect (path c) remained positive and significant. Cognitive flexibility had a significant positive effect on Smartphone Addiction shown by Path B and a significant negative indirect effect through

Cognitive Flexibility was observed by path ab. Phubbing had a significant negative relation with Cognitive Flexibility indicated by path a. The indirect effect (path ab) of Phubbing on Smartphone Addiction via Cognitive Flexibility is considerable and negative, suggesting a suppressive effect in this mediation pathway. Thus, it is possible to conclude that while cognitive flexibility partially mediates the association between phubbing and smartphone addiction, but does not entirely account for the mediation found in the research due to its limited mediation effect size.

Figure 2

Path diagram of the mediation analysis: cognitive flexibility as a mediator between phubbing and smartphone addiction

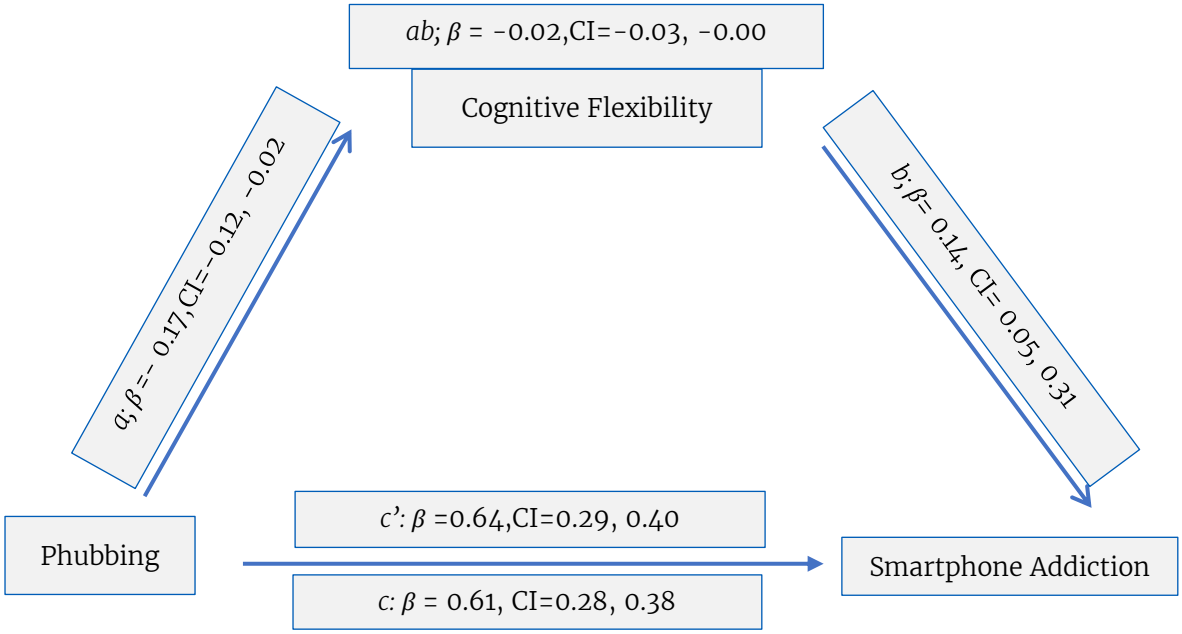


Table 4

Gender Differences across study variables (N=255)

Variables	Male (n=108)		Female (n= 147)				
	M	SD	M	SD	t(253)	P	Cohen's d
Smartphone Addiction	33.02	8.29	32.91	10.4	0.09	0.92	0.01
Phubbing	53.54	16.01	45.86	18.42	3.47	< .001	0.44
Cognitive Flexibility	46.63	7.57	47.91	7.14	-1.36	0.17	0.17

Note: M=Mean,SD= Standard deviation, t=t-value,p= significance level

Table 5 shows t-test results for gender differences among study variables. T-test was conducted to measure variance across gender among the scores of TCF, TSAS, and TGSP. Gender explained 4% of the variation in total phubbing scores. Males had significantly higher levels of total phubbing. There was no significant difference among the means of another variable.

Discussions

Our first prediction suggested a significant positive relationship between phubbing and smartphone addiction. A statistically significant positive relation between phubbing and smartphone addiction was drawn from Pearson correlation analysis (r = .616, p =< 0.01). The findings indicate that among the study participants, there was an increase in smartphone addiction as phubbing behavior increased. These findings add to the literature that addressed the complex link between technology-related consequences and interpersonal behaviors. An explanation for this connection could be: that phubbing, which includes frequent smartphone accessibility and engagement, increases the likelihood of smartphone addiction. This is in line with previous research that found how rising cellphone activities impact technology dependence (Roberts et al., 2014). Present research advances this information by especially exploring the impact of phubbing, a habit rooted in interpersonal contact, as an indicator of smartphone addiction. Another

potential reason for the observed link is that phubbing might give rise to increased smartphone use as people try to recompense for fewer face-to-face encounters. This is in accordance with the displacement theory, which proposes that time spent on cell phones could substitute time spent on other activities, such as in-person social connections (NIE, 2001).

In response to phubbing, phubber receives low social support, which may lead to smartphone addiction. Previous literature revealed that when limited social support is combined with heavy smartphone use, respondents not only have a more positive attitude toward dangerous behaviors while using their smartphones but also experience a higher level of dependence (Herrero et al., 2017).

The findings are useful for the practical and academic fields. Practically, it indicates that phubbing behaviors could be effective at reducing smartphone addiction in interventions. Academically, the study adds to our understanding of the psychological and social factors that drive smartphone addiction.

This study also explores the association between phubbing and cognitive flexibility, by generating a hypothesis. Our analysis confirms the hypotheses, narrating a significant inverse relation between phubbing and cognitive flexibility($r= -.177$, $p= < 0.01$). The findings of this study confirm the hypothesis that there is a negative correlation between decreased cognitive flexibility and higher levels of phubbing activity. This shows that perceived attention deficits are not only significantly related to phubbing but also have predictive power for such behavior (Sansevere & Ward, 2021). Individuals having limited cognitive flexibility have trouble adaptively planning and changing their behaviors to achieve certain objectives. Furthermore, they suffer to shift their focus away from unpleasant stimuli (Hadlington, 2015).

The current study aimed to test the hypothesized inverse association between smartphone addiction and cognitive flexibility. The data found no substantial link between these two factors, which contradicted early predictions ($r=.026$, $p>0.05$). It is crucial to note that the absence of a significant correlation does not suggest the absence of a relationship; rather, it emphasizes the complexity and potentially multiple aspects of the relationships between cognitive flexibility and smartphone addiction. The current study's findings support the hypothesis that cognitive flexibility plays a partly mediation role in the association between phubbing and smartphone addiction. This study adds depth to our knowledge of how these variables interact. In alignment with previous literature overuse of cell phones was linked to decreased concentration, working memory, and cognitive suppression (Yoo & Do, 2022). Previous literature proves that cognitive flexibility mediated the impact of social media addiction on phubbing (Tanhan et al., 2023).

The results are in contrast with previous literature. There are gender differences in phubbing behavior. Females are more likely to engage in phubbing (Escalera, et al,2020). The explanation for this conflict between results may be because of cultural differences or educational background. Men and Women have no significant difference in scores of cognitive flexibility (Martin & Rubin, 1995).

Implications

The study's conclusions have application for both academia and practice, providing insight into the complex connections between, smartphone addiction, phubbing, cognitive flexibility and gender dynamics. The study reveals significant gender differences in the level of phubbing, necessitating specific approaches that consider gender-specific variables influencing these behaviors. The effectiveness of treatments and preventative actions can be increased by taking these aspects into account. By emphasizing phubbing as a distinct field of study and shedding light on the mediating role of cognitive flexibility in the setting of smartphone addiction, this study expands the body of knowledge. The development of sophisticated conceptual models and frameworks for the investigation of digital conduct may benefit from this inquiry. The ramifications underscore the necessity of more research to completely understand the subtleties of these connections. This will establish the foundation for deeper and more complex insights into the study of digital behaviour.

Limitations and Suggestions

Despite providing useful information, the study's shortcomings restrict the generalizability of its conclusions. Its cross-sectional design limits the ability to establish causality or temporal relationships. Self-report measures may add bias, and unanalyzed factors like personality characteristics, stress, or environmental impacts may affect the results. Future studies should use experimental and longitudinal

methods, look at modifiers, and consider potential confounders in order to gain a better understanding of the dynamic relationships between addiction to smartphones, cognitive flexibility, and phubbing.

Conclusions

By analyzing the complex relationships between phubbing, cognitive flexibility, and dependence on smartphones, the study emphasizes the necessity for targeted interventions for tackling phubbing and its effect on compulsive smartphone use. Phubbing's negative link with cognitive flexibility highlights the mental expenses associated with prolonged smartphone use, while its substantial connection with smartphone addiction highlights the influence of digital habits. The relationship between phubbing and addiction is weakly mediated by cognitive flexibility, although previous explanations are challenged by its nonsignificant direct association with smartphone addiction. The results contribute to our understanding of how digital conduct affects cognition and emphasize the significance of gender-specific tactics as well as additional research on the consequences of phubbing.

References

Alexopoulou, A., Batsou, A., & Drigas, A. (2020). Mobiles and Cognition: The Associations Between Mobile Technology and Cognitive Flexibility. *International Journal of Interactive Mobile Technologies (IJIM)*, *14*(03), 146. https://doi.org/10.3991/ijim.v14i03.11233

Alqaderi, N., Banibella, A., Abdelmonem, K. Y. A., Teir, H. J., & Andrade, G. (2023). Phone addiction, cyberbullying, and mental health amongst young adults in the United Arab Emirates: a cross-sectional study. *BMC Psychology*, *11*(1). https://doi.org/10.1186/s40359-023-01320-1

Al-Saggaf, Y., & O'Donnell, S. B. (2019). Phubbing: Perceptions, reasons behind, predictors, and impacts. *Human Behavior and Emerging Technologies*, *1*(2), 132–140. https://doi.org/10.1002/hbe2.137

Al-Saggaf, Y., MacCulloch, R., & Wiener, K. (2018). Trait Boredom Is a Predictor of Phubbing Frequency. *Journal of Technology in Behavioral Science*, *4*(3), 245–252. https://doi.org/10.1007/s41347-018-0080-4

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders: DSM-5 (5th edition). *American Psychiatric Publishing*, *5*(5).

Anshari, M., Alas, Y., Hardaker, G., Jaidin, J. H., Smith, M., & Ahad, A. D. (2016). Smartphone habit and behavior in Brunei: Personalization, gender, and generation gap. *Computers in Human Behavior*, *64*, 719–727. https://doi.org/10.1016/j.chb.2016.07.063

Aygar, H., Tozun, M., Unsal, A., Arslantas, D., Oktar, D., & Dagtekin, G. (2021). Determination of the prevalence of phubbing and its possible relations with personality characteristics and with the other factors among the students of the faculty of medicine from western Turkey. *International Research Journal of Social Sciences*, *10*(1), 20-27.

Backlinko Team. (2024, March 11). *Revealing Average Screen Time Statistics for 2024*. Backlinko. https://backlinko.com/screen-time-statistics

Badre, D., & Wagner, A. D. (2006). Computational and neurobiological mechanisms underlying cognitive flexibility. *Proceedings of the National Academy of Sciences*, *103*(18), 7186–7191. https://doi.org/10.1073/pnas.0509550103

Bağatarhan, T., & Siyez, D. M. (2022). The Effectiveness of a Cognitive-Behavioral Prevention Program for Internet Addiction. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*. https://doi.org/10.1007/s10942-021-00439-7

Bajwa, R. S., Abdullah, H., Zaremohzzabieh, Z., Wan Jaafar, W. M., & Abu Samah, A. (2023). Smartphone addiction and phubbing behavior among university students: A moderated mediation model by fear of missing out, social comparison, and loneliness. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.1072551

Bala, S., Tekkam, S., & Pandve, H. (2020). Consequence of phubbing on psychological distress among the youth of Hyderabad. *Medical Journal of Dr. D.Y. Patil Vidyapeeth*, *13*(6), 642. https://doi.org/10.4103/mjdrdypu.mjdrdypu_315_19

Braem, S., & Egner, T. (2018). Getting a Grip on Cognitive Flexibility. *Current Directions in Psychological Science*, *27*(6), 470–476. https://doi.org/10.1177/0963721418787475

Bulut, S., & Nazir, T. (2020). Phubbing Phenomenon: A Wild Fire, Which Invades Our Social Communication and Life. *Open Journal of Medical Psychology*, *09*(01), 1–6. https://doi.org/10.4236/ojmp.2020.91001

Canas, J. J., Fajardo, I., & Salmeron, L. (2006). Cognitive flexibility. *International encyclopedia of ergonomics and human factors*, *1*(3), 297-301.

Cassidy, A. R. (2020). Cognitive flexibility in critical CHD: a target for intervention. *Cardiology in the Young*, *30*(8), 1061–1069. https://doi.org/10.1017/s1047951120001870

Cetin, H., Turkmen, C., Bal, G. A., Tekerlek, H., Bilgin, S., & Köse, N. (2022). Factors affecting the performance of the deep cervical flexors in young people using smartphones. *CRANIO®*, 1–9. https://doi.org/10.1080/08869634.2022.2078944

Chatterjee, S. (2020). Antecedents of phubbing: from technological and psychological perspectives. *Journal of Systems and Information Technology*, *22*(2), 161–178. https://doi.org/10.1108/jsit-05-2019-0089

Chen, C., Zhang, K. Z. K., Gong, X., Zhao, S. J., Lee, M. K. O., & Liang, L. (2017). Examining the effects of motives and gender differences on smartphone addiction. *Computers in Human Behavior*, *75*, 891–902. https://doi.org/10.1016/j.chb.2017.07.002

Chen, Y., Yu, Y., & Zhu, K. (2023). Analysis of Smartphone Addiction Today: A Literature Review. *Journal of Education, Humanities and Social Sciences*, *8*, 921–927. https://doi.org/10.54097/ehss.v8i.4382

Choi, M.-Y., & Kim, J.-S. (2016). Influence of Cell Phone Addiction on Communication Skills and Interpersonal Relationship Ability of Adolescents. *Journal of the Korean Society of School Health*, *29*(3), 149–155. https://doi.org/10.15434/kssh.2016.29.3.149

Chotpitayasunondh, V., & Douglas, K. M. (2016). How "phubbing" becomes the norm: The antecedents and consequences of snubbing via smartphone. *Computers in Human Behavior*, *63*, 9–18. https://doi.org/10.1016/j.chb.2016.05.018

Chotpitayasunondh, V., & Douglas, K. M. (2018). The effects of "phubbing" on social interaction. *Journal of Applied Social Psychology*, *48*(6), 304–316. https://doi.org/10.1111/jasp.12506

Ciairano, S., Bonino, S., & Miceli, R. (2006). Cognitive flexibility and social competence from childhood to early adolescence. *Cognitie, Creier, Comportament/Cognition, Brain, Behavior*, *10*(3).

Da Silva, S. (2023). System 1 vs. System 2 Thinking. *Psych*, *5*(4), 1057–1076. https://doi.org/10.3390/psych5040071

Dajani, D. R., & Uddin, L. Q. (2015). Demystifying cognitive flexibility: Implications for clinical and developmental neuroscience. *Trends in Neurosciences*, *38*(9), 571–578. https://doi.org/10.1016/j.tins.2015.07.003

Demirtas, A. S. (2020). Hopelessness and perceived stress: the mediating role of cognitive flexibility and intolerance of uncertainty. *Dusunen Adam: The Journal of Psychiatry and Neurological Sciences*. https://doi.org/10.14744/dajpns.2019.00035

Diamond, A. (2013). Executive Functions. *Annual Review of Psychology*, *64*(1), 135–168. https://doi.org/10.1146/annurev-psych-113011-143750

Duradoni, M., Raimondi, T., Buttà, F., & Guazzini, A. (2023). Moving beyond an Addiction Framework for Phubbing: Unraveling the Influence of Intrinsic Motivation, Boredom, and Online Vigilance. *Human Behavior and Emerging Technologies*, *2023*, e6653652. https://doi.org/10.1155/2023/6653652

Elhai, J. D., Dvorak, R. D., Levine, J. C., & Hall, B. J. (2017). Problematic smartphone use: A conceptual overview and systematic review of relations with anxiety and depression psychopathology. *Journal of Affective Disorders*, *207*(207), 251–259. https://doi.org/10.1016/j.jad.2016.08.030

Erzen, E., Odaci, H., & Yeniçeri, İ. (2019). Phubbing: Which Personality Traits Are Prone to Phubbing? *Social Science Computer Review*, *39*(1), 089443931984741. https://doi.org/10.1177/0894439319847415

Escalera -Chávez, M. E., García-Santillán, A., & Molchanova, V. S. (2020). Phubbing Behavior: Is There a Gender Difference in College Students?. *European Journal of Contemporary Education*, *9*(3), 546-551. https://doi.org/10.13187/ejced.2020.3.546

Evans, J. St. B. T., & Stanovich, K. E. (2013). Dual-Process Theories of Higher Cognition. *Perspectives on Psychological Science*, *8*(3), 223–241. https://doi.org/10.1177/1745691612460685

Gao, T., Xiang, Y.-T., Zhang, H., Zhang, Z., & Mei, S. (2017). Neuroticism and quality of life: Multiple mediating effects of smartphone addiction and depression. *Psychiatry Research*, *258*, 457–461. https://doi.org/10.1016/j.psychres.2017.08.074

Geng, J., Lei, L., Ouyang, M., Nie, J., & Wang, P. (2021). The influence of perceived parental phubbing on adolescents' problematic smartphone use: A two-wave multiple mediation model. *Addictive Behaviors*, *121*, 106995. https://doi.org/10.1016/j.addbeh.2021.106995

Gladden, D. (2018). The Effects of Smartphones on Social Lives: How They Affect Our Social Interactions and Attitudes. *OTS Master's Level Projects & Papers*. https://digitalcommons.odu.edu/ots_masters_projects/586

Gladys, & Villalón-Hernández, R. (2023). Estudio de la prevalencia del phubbing durante clases ocasionado por el uso de apps. *Alteridad : Revista de Educación*, *18*(1), 59–69. https://doi.org/10.17163/alt.v18n1.2023.05

Guazzini, A., Duradoni, M., Capelli, A., & Meringolo, P. (2019). An Explorative Model to Assess Individuals' Phubbing Risk. *Future Internet*, *11*(1), 21. https://doi.org/10.3390/fi11010021

Hadlington, L. J. (2015). Cognitive failures in daily life: Exploring the link with Internet addiction and problematic mobile phone use. *Computers in Human Behavior*, *51*, 75–81. https://doi.org/10.1016/j.chb.2015.04.036

Han, S.-G., & Kim, D.-T. (2019). *스마트폰 중독 청소년의 중독원인에 대한 현상학적 분석 한상규 1* , 김동태 2 1 영남이공대학교 교양과 외래교수, 2 영남신학대학교 신학과 외래교수 Phenomenological Analysis on Causes of Addiction in Smartphone Addiction Adolescents*. https://doi.org/10.15207/JKCS.2019.10.5.287

Herrero, J., Urueña, A., Torres, A., & Hidalgo, A. (2017). Smartphone addiction: psychosocial correlates, risky attitudes, and smartphone harm. *Journal of Risk Research*, *22*(1), 81–92. https://doi.org/10.1080/13669877.2017.1351472

Howarth, J. (January 26, 2023). How Many Individuals Use Smartphones? More than 80 Smartphone Statistics. Exploding Subjects. Smartphone Statistics: https://explodingtopics.com/blog/

Ionescu, T. (2012). Exploring the nature of cognitive flexibility. *New Ideas in Psychology*, *30*(2), 190–200. https://doi.org/10.1016/j.newideapsych.2011.11.001

James, R. J. E., Dixon, G., Dragomir, M.-G., Thirlwell, E., & Hitcham, L. (2023). Understanding the construction of "behavior" in smartphone addiction: A scoping review. *Addictive Behaviors*, *137*, 107503. https://doi.org/10.1016/j.addbeh.2022.107503

Jan, A., & Li, E. Y. (2024). *What you see isn't what it is: Understanding the impact of smartphones on interpersonal connections*. AIS Electronic Library (AISeL). https://aisel.aisnet.org/iceb2024/16/

Johnco, C., Wuthrich, V. M., & Rapee, R. M. (2014). The influence of cognitive flexibility on treatment outcome and cognitive restructuring skill acquisition during cognitive behavioural treatment for anxiety and depression in older adults: Results of a pilot study. *Behaviour Research and Therapy*, *57*(57), 55–64. https://doi.org/10.1016/j.brat.2014.04.005

Kemp, S. (2023, February 13). *Digital 2023: Pakistan*. DataReportal – Global Digital Insights. https://datareportal.com/reports/digital-2023-pakistan

Khalily, M., Loona, M., Bhatti, M., Ahmad, I., & Saleem, T. (2020). Smartphone addiction and its associated factors among students in twin cities of Pakistan. *Journal of the Pakistan Medical Association*, *0*, 1. https://doi.org/10.5455/jpma.23054

Kim, C., Johnson, N. F., Cilles, S. E., & Gold, B. T. (2011). Common and Distinct Mechanisms of Cognitive Flexibility in Prefrontal Cortex. *Journal of Neuroscience*, *31*(13), 4771–4779. https://doi.org/10.1523/jneurosci.5923-10.2011

Kim, J.-H. (2021). Factors Associated with Smartphone Addiction Tendency in Korean Adolescents. *International Journal of Environmental Research and Public Health*, *18*(21), 11668. https://doi.org/10.3390/ijerph182111668

Kim, S.-G., Park, J., Kim, H.-T., Pan, Z., Lee, Y., & McIntyre, R. S. (2019). The relationship between smartphone addiction and symptoms of depression, anxiety, and attention-deficit/hyperactivity in South Korean adolescents. *Annals of General Psychiatry*, *18*(1). https://doi.org/10.1186/s12991

Kim, Y., Jeong, J.-E., Cho, H., Jung, D.-J., Kwak, M., Rho, M. J., Yu, H., Kim, D.-J., & Choi, I. Y. (2016). Personality Factors Predicting Smartphone Addiction Predisposition: Behavioral Inhibition and Activation Systems, Impulsivity, and Self-Control. *PLOS ONE*, *11*(8), e0159788. https://doi.org/10.1371/journal.pone.0159788

Koesten, J., Schrodt, P., & Ford, D. J. (2009). Cognitive Flexibility as a Mediator of Family Communication Environments and Young Adults' Well-Being. *Health Communication*, *24*(1), 82–94. https://doi.org/10.1080/10410230802607024

Kuss, D., & Griffiths, M. (2017). Social Networking Sites and Addiction: Ten Lessons Learned. *International Journal of Environmental Research and Public Health*, *14*(3), 311. https://doi.org/10.3390/ijerph14030311

Latifa, R., Mumtaz, E. F., & Subchi, I. (2019, November 1). *Psychological Explanation of Phubbing Behavior: Smartphone Addiction, Emphaty and Self Control*. IEEE Xplore. https://doi.org/10.1109/CITSM47753.2019.8965376

Leuppert, R., & Geber, S. (2020). Commonly done but not socially accepted? Phubbing and social norms in dyadic and small group settings. *Communication Research Reports*, *37*(3), 55–64. https://doi.org/10.1080/08824096.2020.1756767

Li, G.-R., Sun, J., Ye, J.-N., Hou, X.-H., & Xiang, M.-Q. (2023). Family functioning and mobile phone addiction in university students: Mediating effect of loneliness and moderating effect of capacity to be alone. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1076852

Li, L., Niu, Z., Mei, S., & Griffiths, M. D. (2021). A network analysis approach to the relationship between fear of missing out (FoMO), smartphone addiction, and social networking site use among a sample of Chinese university students. *Computers in Human Behavior*, *128*, 107086. https://doi.org/10.1016/j.chb.2021.107086

Li, Y.-X., Zhang, Y.-H., Yang, R., Lian, S.-L., Yan, L., & Zhu, X.-M. (2021). Relationship Between Perceived Social Norms and Phubbing: Individual Control and Fear of Missing Out as Mediators. *International Journal of Mental Health and Addiction*. https://doi.org/10.1007/s11469-021-00696-8

Lian, S.-L., Cao, X.-D., Xiao, Q., Lee, S., Yang, C., & Liu, Q. (2023). Family cohesion and adaptability reduces mobile phone addiction: the mediating and moderating roles of automatic thoughts and peer attachment. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1122943

Lin, W.-L., Tsai, P.-H., Lin, H.-Y., & Chen, H.-C. (2013). How does emotion influence different creative performances? The mediating role of cognitive flexibility. *Cognition and Emotion*, *28*(5), 834–844. https://doi.org/10.1080/02699931.2013.854195

Lin, Y.-H., Chiang, C.-L., Lin, P.-H., Chang, L.-R., Ko, C.-H., Lee, Y.-H., & Lin, S.-H. (2016). Proposed Diagnostic Criteria for Smartphone Addiction. *PLOS ONE*, *11*(11), e0163010. https://doi.org/10.1371/journal.pone.0163010

Mackay, J. (2019, April 5). Screen time stats 2018: How your phone impacts your workday – RescueTime. RescueTime Blog. https://blog.rescuetime.com/screen-time-stats-2018/

Martin, M. M., & Anderson, C. M. (1998). The cognitive flexibility scale: Three validity studies. *Communication Reports*, *11*(1), 1–9. https://doi.org/10.1080/08934219809367680

Martin, M. M., & Rubin, R. B. (1995). A New Measure of Cognitive Flexibility. *Psychological Reports*, *76*(2), 623–626. https://doi.org/10.2466/pr0.1995.76.2.623

Masley, S., Roetzheim, R., & Gualtieri, T. (2009). Aerobic Exercise Enhances Cognitive Flexibility. *Journal of Clinical Psychology in Medical Settings*, *16*(2), 186–193. https://doi.org/10.1007/s10880-009-9159-6

Moore, A., & Malinowski, P. (2009). Meditation, Mindfulness and Cognitive Flexibility. *Consciousness and Cognition*, *18*(1), 176–186. https://doi.org/10.1016/j.concog.2008.12.008

Mutchler, L., Shim, J. P., & Ormond, D. (2011). Exploratory Study on Users' Behavior: Smartphone Usage. *AMCIS 2011 Proceedings - All Submissions*. https://aisel.aisnet.org/amcis2011_submissions/418/

Nagarajappa, R., Naik, D., & Ramesh, G. (2020). Emerging Consequences of Phubbing among Adults. *Indian Journal of Forensic Medicine & Toxicology*, *14*(4). https://doi.org/10.37506/ijfmt.v14i4.12936

Nazir, T., & Bulut, S. (2019). Phubbing: a phenomenon that is mending social relationships. *Сибирский психологический журнал*, (74), 101-109. https://cyberleninka.ru/article/n/phubbing-a-phenomenon-that-is-mending-social-relationships

Neisser, U., & Becklen, R. (1975). Selective looking: Attending to visually specified events. *Cognitive Psychology*, *7*(4), 480–494. https://doi.org/10.1016/0010-0285(75)90019-5

Nie, N. H. (2001). Sociability, Interpersonal Relations, and the Internet. *American Behavioral Scientist*, *45*(3), 420–435. https://doi.org/10.1177/00027640121957277

Ozcan, B., & Acimis, N. M. (2021). Sleep Quality in Pamukkale University Students and its relationship with smartphone addiction. *Pakistan Journal of Medical Sciences*, *37*(1), 206–211. https://doi.org/10.12669/pjms.37.1.3130

Parasuraman, S., Sam, A., Yee, S. K., Chuon, B. C., & Ren, L. (2017). Smartphone usage and increased risk of mobile phone addiction: A concurrent study. *International Journal of Pharmaceutical Investigation*, *7*(3), 125. https://doi.org/10.4103/jphi.jphi_56_17

Parmaksız, İ., & Kılıçarslan, S. (2021). AGGRESSION AND EMOTIONAL INTELLIGENCE AS PREDICTORS OF PHUBBING. *Psycho-Educational Research Reviews*. https://doi.org/10.52963/perr_biruni_v10.n3.12

Peleg, O., & Boniel-Nissim, M. (2024). Exploring the personality and relationship factors that mediate the connection between differentiation of self and phubbing. *Scientific Reports*, *14*(1). https://doi.org/10.1038/s41598-024-55560-1

Peleg, O., & Boniel-Nissim, M. (2024). Exploring the personality and relationship factors that mediate the connection between differentiation of self and phubbing. *Scientific Reports*, *14*(1). https://doi.org/10.1038/s41598-024-55560-1

Rahman, M. A., Duradoni, M., & Guazzini, A. (2021). Identification and prediction of phubbing behavior: a data-driven approach. Neural Computing and Applications, 34(5), 3885–3894. https://doi.org/10.1007/s00521-021-06649-5

Roberts, J., Yaya, L., & Manolis, C. (2014). The invisible addiction: Cell-phone activities and addiction among male and female college students. *Journal of Behavioral Addictions*, *3*(4), 254–265. https://doi.org/10.1556/jba.3.2014.015

Sansevere, K. S., & Ward, N. (2021). Linking Phubbing Behavior to Self-Reported Attentional Failures and Media Multitasking. *Future Internet*, *13*(4), 100. https://doi.org/10.3390/fi13040100

Schneider, F. M., & Hitzfeld, S. (2019). I ought to put down that phone but I phub nevertheless: Examining the predictors of phubbing behavior. *Social Science Computer Review*, *39*(6), 089443931988236. https://doi.org/10.1177/0894439319882365

Stevens, A. D. (2009). *Social problem-solving and cognitive flexibility: Relations to social skills and problem behavior of at-risk young children*. Seattle Pacific University.

Sun, J., & Samp, J. A. (2021). "Phubbing is happening to you": examining predictors and effects of phubbing behaviour in friendships. *Behaviour & Information Technology*, *41*(12), 1–14. https://doi.org/10.1080/0144929x.2021.1943711

Tanhan, F., Özok, H. İ., Kaya, A., & Yıldırım, M. (2023). Mediating and moderating effects of cognitive flexibility in the relationship between social media addiction and phubbing. *Current Psychology*. https://doi.org/10.1007/s12144-023-04242-8

Themanson, J. R., Pontifex, M. B., & Hillman, C. H. (2008). Fitness and action monitoring: Evidence for improved cognitive flexibility in young adults. *Neuroscience*, *157*(2), 319–328. https://doi.org/10.1016/j.neuroscience.2008.09.014

Tran, D. (2016). Classifying Nomophobia as Smart-Phone Addiction Disorder. *UC Merced Undergraduate Research Journal*, *9*(1). https://doi.org/10.5070/m491033274

Wang, Q., Chen, H., Hu, W., & Zhao, F. (2023). Social networking sites addiction and depression among Chinese college students: The mediating role of cognitive flexibility and the moderating role of chronotype. *Children and Youth Services Review*, *155*, 107209–107209. https://doi.org/10.1016/j.childyouth.2023.107209

Yang, G., Li, Y., Liu, S., Liu, C., Jia, C., & Wang, S. (2021). Physical activity influences the mobile phone addiction among Chinese undergraduates: The moderating effect of exercise type. *Journal of Behavioral Addictions*. https://doi.org/10.1556/2006.2021.00059

Yang, J., Fu, X., Liao, X., & Li, Y. (2019). Association of problematic smartphone use with poor sleep quality, depression, and anxiety: A systematic review and meta-analysis. *Psychiatry Research*, *284*, 112686. https://doi.org/10.1016/j.psychres.2019.112686

Yang, K.-M. (2016). The Effect of Self-Esteem and Depression on Smartphone Addiction among University Students. *Journal of the Korea Convergence Society*, *7*(1), 113–123. https://doi.org/10.15207/JKCS.2016.7.1.113

Yoo, I.-G., & Do, J.-H. (2022). Exploring the link between smartphone overuse and cognitive decline: a scoping review. *Family Medicine & Primary Care Review*, *24*(1), 92–99. https://doi.org/10.5114/fmpcr.2022.113022

Yu, S., & Sussman, S. (2020). Does Smartphone Addiction Fall on a Continuum of Addictive Behaviors? *International Journal of Environmental Research and Public Health*, *17*(2), 422. https://doi.org/10.3390/ijerph17020422

Zhang, K., Lu, X., Zhang, X., Zhang, J., Ren, J., Guo, H., Zhu, Z., Yang, H., Yuan, G., Jin, G., Du, J., Shi, H., Hao, J., Sun, Y., Su, P., Yang, L., & Zhang, Z. (2023). Effects of Psychological or Exercise Interventions on Problematic Mobile Phone Use: a Systematic Review and Meta-analysis. *Current Addiction Reports*, *10*(2), 230–253. https://doi.org/10.1007/s40429-023-00471-w