

Egyptian university students' smartphone addiction and their digital media literacy level

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ABSTRACT

This study examined the correlation between Egyptian university students' smartphone addiction and digital media literacy. Data were gathered from a sample of 558 students enrolled at Minia University, aged 18-22, using an online questionnaire. Results revealed a significant positive correlation between smartphone overuse and digital media literacy levels. Moreover, it was found that university students obtained higher scores on the smartphone addiction scale, and social networking applications (e.g., WhatsApp, Instagram, and TikTok). Also, it was found that smartphone gaming, learning, and entertainment apps increase the likelihood of smartphone addiction and boost digital media literacy levels. These findings suggest that smartphone addiction may have positive effects on young adults; so, smartphone use should be oriented to benefit mobile users.

Keywords: *media literacy, digital media literacy, smartphone addiction, smartphone applications, smartphone motivations, university students.*



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INTRODUCTION

Smartphones have changed global lifestyles and have become an integral part of life itself. For many people, especially teens, smartphones provide an ever-increasing range of entertainment options like internet surfing, playing games, and communication with others (Abbasi et al., 2021; Lepp et al., 2017).

In a similar vein, smartphones were globally used by 3.668 billion people in 2016. This number is expected to increase to 6.378 billion in 2021 and 7.516 billion in 2026 (Statista, 2021). In January 2021, Egypt had 101.03 million mobile connections, with an average daily time of 4 hours and 20 minutes of mobile internet (Kemp, 2021). 70% of internet users are university students (MCIT, 2021). Even though smartphones play a critical role in our daily functioning, their growing use has both negative and positive consequences (Geng et al., 2021; Hughes & Burke, 2018).

Frequent usage and over-reliance on smartphone addiction threaten the mental health of users and could lead to negative emotions such as depression, introversion, psychological stress, academic performance difficulties, and many social problems (Abbasi et al., 2021; Aljomaa et al., 2016; Felisoni & Godoi, 2018; Kil et al., 2021; Samaha & Hawi, 2016). Moreover, physical disorders due to overuse of smartphones have also been reported, including early neck pain, musculoskeletal disorders (Karkusha et al., 2019), visual fatigue, eye strain, and dry and burning eyes (Kim et al., 2017). Regarding Egyptian university students, 60% of them suffered from depression, anxiety, sleep disturbances, smoking-related smartphone addiction, and suicidal tendencies (Okasha et al., 2021).

The positive outcomes of using smartphones relate to the capabilities they provide to empower individuals to get informed, enhance their internet literacy skills, and deliver them with customized content, thus helping them fulfill their needs (Hong et al., 2016; Park & Burford, 2013).

Compared to computers, smartphones are cheaper and do not require infrastructure costs, cutting-edge equipment, or skills. Accordingly, the internet has become mobile and internet addiction is a result of smartphone addiction (Noë et al., 2019). In fact, for the vast majority of individuals, the smartphone has become their primary device of access to the digital world (Correa et al., 2020).

Regular mobile users usually have some digital skills, such as finding precise information, verifying it,

taking, and sharing photos, and editing videos. These skills are essential for living in a digital media environment and obtaining literate in digital media (Park & Burford, 2013). Hence, digital media literacy is critical because digital media have removed the boundaries between watching and participation, thus enabling the audience to create their content, which was previously restricted to media professionals (Suwana, 2021).

Digital media literacy, according to Kwon et al. (2018) and Park et al. (2015), is the ability to search for specific information, share content, and use the functions and features of social media and the internet through active participation.

The current study is aimed at identifying the positive aspects and consequences of smartphone addiction among Egyptian university students by examining the relationship between smartphone addiction and the level of digital media literacy.

Statement of the problem

University students are very interested in owning smartphones that take up a significant amount of their time and thinking (Aljomaa et al., 2016). Smartphones enable users to access the internet, check emails, interact on social networking sites (SnapChat, Facebook, Twitter, etc.), stay up to date with news and weather, watch videos, determine geographic and accurate locations, listen to songs, play favorite games, take pictures, and share them with others, shop, etc. (Chen et al., 2017; Samaha & Hawi, 2016). Therefore, university students spend more time using their smartphones every day, thus leading to smartphone addiction (Abbasi et al., 2021; Noë et al., 2019). Smartphone use involves internet browsing, searching for information, taking pictures, editing, and sharing content (Bennett et al., 2018; Škařupová et al., 2016). These are the very abilities required for digital media literacy (Dridi, 2021; Felisoni & Godoi, 2018; Moon & Bai, 2020; Park, 2012). Additionally, digital media literacy is related to the amount of time, frequency, and online activities people engage with. As activities increase and diversify, users become more digital media literate (Wei, 2012); so, we can relate the use of smartphones to digital media literacy skills.

Against this background, the current study explores the relationship between university students' smartphone overuse and digital media skills acquisition. More specifically, the study addresses the following questions:

1. Are Egyptian university students addicted to their smartphones?
2. Do smartphone motivations (e.g., entertainment, gaming, studying, learning, and communication apps) impact the smartphone addiction level among the participants?
3. Do smartphone applications (e.g., Facebook, YouTube, TikTok, SnapChat, WhatsApp, and Instagram) impact the participants' smartphone addiction?
4. What is the level of Egyptian university students' digital media literacy?
5. Is smartphone addiction associated with digital media literacy levels among the participants?
6. Do university students' motivations for using smartphones (e.g., Entertainment, Study assignments, Games, Learning, and Communication) impact their digital media literacy?
7. Which smartphone applications (e.g., Facebook, YouTube, TikTok, Snap Chat, WhatsApp, and Instagram) impact digital media literacy levels among the participants?

LITERATURE REVIEW

Smartphone addiction

Smartphones are mobile phones that have multi-functions and advanced features that enable users to download, use various applications, and surf the internet (Aljomaa et al., 2016; Lin et al., 2014). Although smartphones can be a highly productive tool in daily life, their overuse causes many troubles similar to those caused by drug addiction, including psychological withdrawal symptoms after quitting using smartphones (Elhai et al., 2020). Furthermore, excessive use of smartphones may have a negative impact on students' academic performance and activities (Felisoni & Godoi, 2018).

Smartphone addiction is defined as a user's inability to control their smartphone usage despite the negative consequences of doing so (Cha et al., 2018). This addiction is linked to higher levels of anxiety and depression (Geng et al., 2021; Stanković et al., 2021; Park, 2012), cognitive absorption (Barnes et al., 2019), low self-esteem (Kim & Koh, 2018), and attention reduction of university students (Kim et al., 2016). Smartphone addiction effects are identical to drug and alcohol disorders (Panova & Carbonell, 2018).

Using smartphones for educational purposes was not reported to lead to addiction (Abbasi et al., 2021; Jeong et al., 2016) compared to using social networking applications that are mainly responsible for smartphone addiction (Cocoradă et al., 2018; Leung et al., 2020; Noë et al., 2019; Salehan & Negahban, 2013) followed by gaming applications (Jeong et al., 2016).

Smartphone addiction negatively affects university students' self-study ability and self-control (Geng et al., 2021; Lee et al., 2015). Furthermore, reducing smartphone consumption was associated with less stress and anxiety in adults besides improving their personal relationships and time saving (Hughes & Burke, 2018).

Simultaneously, smartphone addiction has positive consequences such as helping students in their university courses (Saxena et al., 2018), self-regulated learning (Sha et al., 2012), ubiquitous learning for languages (Steel, 2012; Thornton & Houser, 2005), and enhancing their digital skills (Blažič & Blažič, 2020). These findings highlight many advantages of smartphone use, such as reducing the digital gap, quick information access, and self-learning. Moreover, users' smartphone literacy decreases privacy concerns and enhances their attitudes toward digital devices (Ketelaar & van Balen, 2018). Therefore, excessive smartphone use is associated with higher levels of internet literacy (Hong et al., 2016). Also, young people's knowledge of digital literacy and data security has improved because of their use of mobile phones (Hongthong & Temdee, 2018). All these advantages have encouraged university students to increasingly rely on smartphones.

Digital media literacy

Digital media literacy is defined in a variety of ways, but they all revolve around information, communication technologies, digital literacy, and digital capabilities (Zhang & Zhu, 2016). As indicated by many researchers, digital media literacy is a multi-dimension concept that incorporates some interactive components (e.g., access, understanding, and creating) (Dridi, 2021; Koltay, 2011; Kwon et al., 2013; Moon & Bai, 2020; Park et al., 2015; Park, 2012)

As one of the characteristics of digital media literacy, the *access* dimension refers to an individual's use of digital media owning a digital device or more, demonstrating a range of skills, and understanding a set of device features and functions (Park, 2012). Whereas digital media does not present the audience with unified messages in the same way that traditional media does, users have to be able to find content by searching and

filtering (Park, 2012). Thus, the *understand* dimension refers to analyzing digital media, assessing the content efficiently concerning quality and accuracy to evaluate information (Koltay, 2011), and demonstrating a set of technical skills to utilize digital devices and content effectively (Zhang & Zhu, 2016).

Both digital media literacy and media literacy share the *access* and *understand* dimensions, which emphasize a user's ability to identify the information source, acquire proper and relevant information, and understand, analyze, and evaluate messages. The *create* dimension is a unique component of digital media literacy (Moon & Bai, 2020); it refers to the ability to produce digital content and interact with others through various digital media (Zhang & Zhu, 2016). In addition to the ability to express opinions and ideas and create these digitally, considering ethics and social impact (Park, 2012).

METHOD

This research follows the digital media literacy scale as in Eristi and Erdem (2017), Zhang et al. (2016) and Park (2012). The scale includes three dimensions: technical and access skills, skills of critical understanding, and creation. By integrating the above-mentioned dimensions, the current study adopts three dimensions to measure digital media literacy: *access* which is made up of two sub-dimensions (device access, content access), *understand* which is formed of technical and critical skills, and *create* in addition to the Smartphone Addiction Scale-Short Version (SAS-SV) by Kwon et al. (2013).

Questionnaire development

The questionnaire included three sections. The first focused on basic data such as sex, age, the most frequently used smartphone apps, and motivations for using smartphones. The second section included 25 items divided into five dimensions of the digital media literacy scale (see Appendix A). Participants were invited to rate their (dis)agreement on each item on a 5-point Likert-type scale ranging from 1 "strongly disagree" to 5 "strongly agree". Additionally, the third section incorporated the Smartphone Addiction Scale-Short Version (SAS-SV) developed by Kwon et al (2013) (see Appendix B). The SAS-SV is a 10-point smartphone addiction scale that rates smartphone addiction on scales from 1 (strongly disagree) to 6 (strongly agree). The total score was calculated by

summing all the participants' scores for each item, and the total score ranged from 10 to 60. A high score on the scale indicates the severity of smartphone addiction at a score of 31 for males and 33 for females. The Cronbach coefficient in this study was 0.87 and the smartphone addiction scale consists of 10 items (Kwon et al., 2013).

Participants

600 Minia University, Egyptian students took part in an online questionnaire. The questionnaire was sent to the participants in the second semester of the academic year 2019-2020. Forty-two participants' answers were found incomplete and were thus excluded, decreasing the final sample size to 558 participants (172 males making up 30.2% and 386 females making up 69.8%). All participants were undergraduates and the average age when using their smartphones for the first time was 14.24 years.

Questionnaire validity and reliability

To establish the questionnaire's validity, the researcher asked 9 university professors in media and psychology to review the questionnaire. They offered valuable suggestions on the clarity of questions and phrasing consistency of the scale's items. Some correlations were used to determine the questionnaire's internal consistency like 1) the correlations between the items and the whole dimension scale of digital media literacy to which they fit (correlation coefficients graded from 0.83 to 0.92), 2) the correlations between the smartphone addiction scale items and the entire questionnaire (correlation coefficients ranged from 0.82 to 0.91), and 3) the correlations between the items and the entire questionnaire (correlation coefficients ranged from 0.86 to 0.94). All the correlations were found significant.

The test-retest approach was used to determine the questionnaire's reliability. The questionnaire was distributed twice among a pilot group of 60 students (males and females) who were not part of the main sample, with a two-week delay between each administration. The Pearson correlation coefficients graded between 0.89 and 0.92. Moreover, the questionnaire's internal consistency was established using the Cronbach's Alpha method. The alpha correlation coefficients for the questionnaire ranged from 0.82 to 0.90. The confidence coefficient for the entire questionnaire is 0.96. Therefore, all coefficients

are significant, indicating that the questionnaire is quite reliable.

Data analysis

Data were statistically analyzed using the SPSS version 26 program. Percentages, means, standard deviations, and Pearson correlation were used to answer the research questions.

RESULTS

To answer the first question (“Are Egyptian university students addicted to their smartphones?”), the percentage of the total and average smartphone addiction scale were used as the basis for identifying smartphone addicts. Based on this, the average score of males is 34.54 and that of females is 34.57, in addition,

218 female participants (56.48%) graded from a score of 33 to 53, and 120 male participants (69.77%) graded from a score of 31 to 56 out of the total score of the smartphone addiction scale. That is, 60.57% of Egyptian university students are addicts to smartphones.

Egyptian university students have high ratings on the smartphone addiction scale, as seen in Table 1. All average scores of distributions for smartphone addiction items were graded from a score of 3 to 4.67, except for the answer to Item 8 “I make sure to have my smartphone when I use the toilet” which got the minimum average of 2.33. The results illustrate an overuse of smartphones by university students. These results clearly illustrate that university students are addicted to smartphones, as the mean is higher than 3.00 in 9 items out of the 10 items making up the total smartphone addiction scale.

Table 1. Responses to the ten questions on “smartphone addiction”

Items	Strongly agree (%)	Agree (%)	Somewhat agree (%)	Somewhat disagree (%)	Disagree (%)	Strongly disagree (%)	Mean
Item 1	78 (14)	124 (22.2)	194 (34.8)	76 (13.6)	72 (12.9)	14 (2.5)	4.03
Item 2	44 (7.9)	76 (13.6)	124 (22.2)	78 (14)	158 (28.3)	78 (14)	3.16
Item 3	60 (10.8)	148 (26.5)	136 (24.4)	36 (6.5)	118 (21.1)	60 (10.8)	3.67
Item 4	38 (6.8)	76 (13.6)	124 (22.2)	92 (16.5)	150 (26.9)	78 (14)	3.15
Item 5	30 (5.4)	90 (16.1)	206 (36.9)	88 (15.8)	108 (19.4)	36 (6.5)	3.53
Item 6	66 (11.8)	94 (16.8)	120 (21.5)	80 (14.3)	116 (20.8)	82 (14.7)	3.40
Item 7	140 (25.1)	220 (39.4)	118 (21.1)	42 (7.5)	32 (5.7)	6 (1.1)	4.67
Item 8	28 (5)	50 (9)	60 (10.8)	40 (7.2)	146 (26.2)	234 (41.9)	2.33
Item 9	70 (12.5)	132 (23.7)	112 (20.1)	50 (9)	132 (23.7)	62 (11.1)	3.59
Item 10	46 (8.2)	92 (16.5)	68 (12.2)	76 (13.6)	166 (29.7)	110 (19.7)	3.00

Table 2. Correlation between smartphone motivations and smartphone addiction

Smartphone motivations	Smartphone addiction	
	r	p
Entertainment	0.039	0.363
Study assignments	0.049	0.251
Games	0.107*	0.011
Learning	0.012	0.786
Communication	- 0.025	0.557

(*) Correlation is significant at the 0.05 level (1-tailed).

To answer the second question: “Do smartphone motivations (e.g., entertainment, gaming, studying, learning, and communication apps) impact the smartphone addiction level among the participants?” the Pearson correlation was computed to explore the correlation between students’ smartphone motivations and smartphone addiction. Table 2 shows that

smartphone use in gaming is positively correlated with smartphone addiction. In addition, there is a slight correlation between smartphone addiction and other motivations (e.g., entertainment, study assignments, learning), as well as a non-significant negative correlation between smartphone addiction and the use of smartphones in communication.

To respond to the third question: “Do smartphone applications (e.g., Facebook, YouTube, TikTok, SnapChat, WhatsApp, and Instagram) impact the participants’ smartphone addiction?” the Pearson’s correlation was used to investigate the relationship between the use of smartphone applications and

smartphone addiction among university students. Table 3 shows that university students’ use of YouTube, TikTok, and Instagram is positively correlated with smartphone addiction, while other applications (e.g., Facebook, WhatsApp, and SnapChat) correlate non-significant with smartphone addiction.

Table 3. *Correlations between the use of smartphone applications and smartphone addiction*

Smartphone apps use	Smartphone addiction	
	r	p
Facebook	-0.064	0.066
YouTube	0.147**	0.000
TikTok	0.082*	0.026
WhatsApp	-0.026	0.273
SnapChat	0.046	0.140
Instagram	0.073*	0.042

(*)/(**) Correlation is significant at the 0.05, and 0.01 level (1-tailed).

Table 4. *Responses to the digital media literacy scale*

Dimension	Items	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)	Mean
Device access	Item 1	108 (19.4)	78 (14)	230 (41.2)	90 (16.1)	52 (9.3)	3.17
	Item 2	306 (54.8)	136 (24.4)	100 (17.9)	10 (1.8)	6 (1.1)	4.30
	Item 3	136 (24.4)	138 (24.7)	226 (40.5)	38 (6.8)	20 (3.6)	3.59
	Item 4	134 (24)	146 (26.2)	206 (36.9)	50 (9)	22 (3.9)	3.57
	Item 5	180 (32.3)	174 (31.2)	148 (26.5)	42 (7.5)	14 (2.5)	3.83
Content access	Item 6	164 (47.3)	186 (33.3)	70 (12.5)	34 (6.1)	4 (0.7)	4.20
	Item 7	308 (55.2)	168 (30.1)	58 (10.4)	16 (2.9)	8 (1.4)	4.34
	Item 8	300 (53.8)	156 (28)	84 (15.1)	10 (1.8)	8 (1.4)	4.30
	Item 9	168 (30.1)	176 (31.5)	152 (27.2)	56 (10)	6 (1.1)	3.79
	Item 10	262 (47)	200 (35.8)	74 (13.3)	20 (3.6)	2 (0.4)	4.25
Technical understand	Item 11	342 (61.3)	158 (28.3)	46 (8.2)	10 (1.8)	2 (0.4)	4.48
	Item 12	244 (43.7)	170 (30.5)	90 (16.1)	48 (8.6)	6 (1.1)	4.07
	Item 13	274 (49.1)	182 (32.6)	62 (11.1)	30 (5.4)	10 (1.8)	4.21
	Item 14	262 (47)	198 (35.5)	76 (13.6)	8 (1.4)	14 (2.5)	4.22
	Item 15	182 (32.6)	200 (35.8)	144 (25.8)	26 (4.7)	6 (1.1)	3.94
Critical understand	Item 16	242 (43.4)	182 (32.6)	68 (12.2)	62 (11.1)	4 (0.7)	4.06
	Item 17	196 (35.1)	144 (25.8)	100 (17.9)	62 (11.1)	56 (10)	3.64
	Item 18	222 (39.8)	164 (29.4)	82 (14.7)	56 (10)	34 (6.1)	3.86
	Item 19	186 (33.3)	172 (30.8)	118 (21.1)	52 (9.3)	30 (5.4)	3.77
	Item 20	234 (41.9)	166 (29.7)	108 (19.4)	34 (6.1)	16 (2.9)	4.01
Create	Item 21	262 (47)	176 (31.5)	84 (15.1)	22 (3.9)	14 (2.5)	4.16
	Item 22	240 (43)	164 (29.4)	98 (17.6)	44 (7.9)	12 (2.2)	4.03
	Item 23	294 (52.7)	130 (23.3)	80 (14.3)	38 (6.8)	16 (2.9)	4.16
	Item 24	244 (43.7)	162 (29)	104 (18.6)	34 (6.1)	14 (2.5)	4.05
	Item 25	254 (45.5)	142 (25.4)	96 (17.2)	38 (6.8)	28 (5)	3.99

Answering the fourth question (“What is the level of Egyptian university students’ digital media literacy?”), relied on the average score of the digital media literacy scale items. Table 4 indicates high average scores of the 25 items of digital media literacy, ranging from 3.17 to 4.48, which confirms that Egyptian university students have higher levels of digital media literacy skills.

To answer the fifth question (“Is smartphone addiction correlated with digital media literacy levels among the participants?”), Pearson’s correlation was calculated to explore the link between university students’ dependence on smartphones and their digital

media literacy. Table 5 shows that smartphone addiction is positively correlated with digital media literacy ($r = 0.115, p < 0.01$). In addition to the digital media literacy dimensions, results illustrate a significant positive correlation between smartphone addiction and the *content access* dimension ($r = 0.237, p < 0.01$), the *critical understand* dimension ($r = 0.231, p < 0.01$), and the *create* dimension ($r = 0.116, p < 0.01$). Furthermore, the other dimensions (*technical understand*, and *device access*) have a non-significant positive correlation with smartphone addiction.

Table 5. Correlations between smartphone addiction and digital media literacy

Smartphone addiction	Digital media literacy					
	Device access	Content access	Technical understand	Critical understand	Create	Total scale
	0.056	0.237**	0.061	0.231**	0.116**	0.115**

(**) Correlation is significant at the 0.01 level (1-tailed).

Table 6. Correlation between smartphone motivations and digital media literacy

Smartphone motivations	Digital Media Literacy					
	Device access	Content access	Technical understand	Critical understand	Create	Total scale
Entertainment	0.077*	0.042	0.087*	0.048	0.031	0.047
Study assignments	0.003	0.002	0.003	0.003	0.001	0.024
Games	0.088*	0.040	0.081*	0.048	0.083*	0.028
Learning	0.085*	0.038	0.082*	0.038	0.063	0.050
Communication	0.242	0.178	0.249	0.171	0.133	0.291

(*) Correlation is significant at the 0.05 level (1-tailed).

To answer the sixth question (“Do university students’ motivations for using smartphones impact their digital media literacy?”), Pearson’s correlation was used to explore the relationship between smartphone motivations and digital media literacy among university students. Table 6 demonstrates a significant positive correlation ($r = 0.077, 0.087$) between entertainment and two categories of digital media literacy (*device access* and *technical understand*). Moreover, games have a significant positive relationship with *device access*, *technical understand*, and *create* ($r = 0.088, 0.081, \text{ and } 0.083$). The results show a significant positive correlation between learning and the *device access* dimension ($r = 0.085$) and the *technical understand* dimension ($r = 0.082$). Therefore, the other dimensions

of digital media literacy have a non-significant correlation with smartphone motivations.

To explore the relationship between the use of smartphone applications and university students’ level of digital literacy (as in the seventh question “Which smartphone applications (e.g., Facebook, YouTube, TikTok, SnapChat, WhatsApp, and Instagram) impact digital media literacy levels among the participants?”), the Pearson’s correlation was calculated. Table 7 illustrates a significant positive correlation between the use of smartphone applications and digital media literacy. For instance, Instagram use increases *content access* and *critical understand* levels ($r = 0.075, 0.079$). There is also a positive relationship between TikTok, and WhatsApp use and the *create* dimension ($r = 0.088, 0.098$).

Table 7. *Correlations between the use of smartphone applications and digital media literacy*

Smartphone apps use	Digital media literacy					
	Device access	Content access	Technical understand	Critical understand	Create	Total scale
Facebook	0.060	0.018	0.068	0.020	0.024	0.026
YouTube	0.039	0.035	0.029	0.041	0.034	0.032
TikTok	0.061	0.001	0.061	0.003	0.088*	0.047
WhatsApp	0.052	0.045	0.052	0.41	0.098*	0.041
Snap Chat	0.010	0.018	0.010	0.014	0.066	0.018
Instagram	0.008	0.075*	0.009	0.079*	0.043	0.028

(*) Correlation is significant at the 0.05 level (1-tailed).

DISCUSSION AND CONCLUSION

The study explored smartphone addiction among Egyptian university students at Minia University, Egypt, and investigated whether there was a correlation between smartphone addiction and digital media literacy. Results revealed that the percentage of smartphone addiction among Minia University students is 60.57%. This percentage is higher than is found in some Arab countries (e.g., Aljomaa et al., 2016), but similar to foreign countries (e.g., Szpakow et al., 2011), furthermore, there is a slight difference between males and females in smartphone addiction average score, where the average score of males is 34.54 and that of females is 34.57, and these findings are congruous with (Albursan et al., 2019). This result can be attributed to the unprecedented widespread of and access to smartphones that are simple to use and more compact than traditional computers. In addition to the various motivations leading smartphone users to smartphone addiction, the findings revealed that using smartphones for games is positively correlated with smartphone addiction while using smartphones for learning and studying has a slight positive correlation with smartphone addiction. This finding also concurs with the studies conducted by (Abbasi et al., 2021; Jeong et al., 2016). Moreover, smartphones provide users with a wider range of functions and applications. However, this study demonstrates that the frequency and amount of time spent on Facebook do not lead to smartphone addiction, while TikTok, YouTube, and Instagram are positively correlated with smartphone addiction. This agrees with the findings by (Cocoradă et al., 2018; Leung et al., 2020; Noë et al., 2019; Salehan & Negahban, 2013). Digital media literacy key findings can be summarized as follows. First, university students have greater levels of digital media literacy skills, and smartphone addiction is positively correlated with digital media literacy. This agrees with Blažič & Blažič,

2020; Hongthong & Temdee, 2018; Hong et al., 2016; Ketelaar & van Balen, 2018). Second, smartphone apps use correlates positively with digital media literacy. For instance, Instagram users have a set of skills in the content access and critical understanding dimensions, and WhatsApp and TikTok applications lead to create skills. This conclusion refers to the fact that numerous young adults spend a significant amount of time on TikTok, WhatsApp, and Instagram (Auxier & Anderson, 2021). Third, the findings revealed a link between smartphone motivations and digital media literacy. When students use a smartphone for entertainment and learning, their levels of the device access and technical understanding dimensions increase. Therefore, game motivation leads to improving the *create*, *technical understanding*, and *device access* dimensions. This result is attributed to the fact that smartphones empower users to access information quickly and facilitate self-learning. In addition, entertainment, learning, and games require the user to have a set of technical understanding skills of smartphone functions and applications, and this increases the skills of device access. Lastly, Egyptian university students have higher levels of the five dimensions of digital media literacy (device access, content access, technical understand, critical understand, and create). This is owing to their smartphone addiction, using a variety of applications, and various smartphone motivations.

Only a few studies looked into the consequences of smartphone addiction on digital media literacy. This could be the first study to examine the correlation between smartphone addiction and digital media literacy among university students, considering smartphone motivations and the most frequently used apps. In Egypt, digital media literacy is not a regular course at universities, and it is usually carried out by self-learning. Moreover, digital media literacy is an important part of shaping young people's thinking and knowledge (Dridi,

2021). Hence, smartphone applications such as TikTok, WhatsApp, Instagram, and YouTube provide users with knowledge, entertainment, and a range of multi-functions.

In conclusion, current research clearly shows that university students' smartphone addiction is positively associated with their digital media literacy level. This addiction developed because of excessive use of smartphones for several applications and functions, to satisfy the user's needs for communication, knowledge, entertainment, games, etc., and this use requires various skills (such as access to content, understand some instructions, and technical terms, create content, etc.) and these skills characterize digital media literacy.

Limitations and implications

It should be noted that there are several limitations to this study. All participants are university students whose ages range between 18 and 22, and all of them are enrolled at one Egyptian university (Minia University), because Minia University students came from all governorates and regions of Egypt, it is appropriate to apply the findings to all Egyptian university students. Thus, represents three limitations concerning age, educational level, and type of education (public university education). The sample size should have been increased to include students from different educational stages and many universities. Although the instrument's reliability and validity were validated in this study, future testing with other samples, such as students of other educational levels, would be beneficial to further verify the instrument's validity.

Despite these limitations, this study proposed solutions to several issues in the field of digital media literacy. It shows the extent of smartphone addiction among university students, as well as some positive aspects of smartphone addiction such as the development of digital media literacy skills among university smartphone addicts. The study locale as described above is Egypt, a developing country where economic and technological barriers prevent students from developing high digital skills. Although students use a wide range of digital tools, including desktop computers, tablets, and wearable devices, the current study focused on smartphones only; hence, future research could include students' use of other digital devices and their impact on digital media literacy skills. Therefore, the study recommends that digital media literacy, particularly concerning smartphones, be included in university curricula.

Furthermore, there is a desperate need for university admins and members who are interested in considering smartphones' affordances and benefits, to provide training on the use of smartphones in education to expand students' and members' digital media literacy skills, such as information access, evaluation, and create content to empower the overall education quality.

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APPENDIX A

Digital media literacy scale

Device access

- Item 1: I use a mobile phone without an internet connection
- Item 2: I use my mobile phone to access the internet
- Item 3: I use a computer
- Item 4: I use other devices (such as an iPad) to access the internet
- Item 5: I play computer games

Content access

- Item 6: To access the information or data I need; I can functionally use different search engines and databases.
- Item 7: I can search for specific information through social networking sites (Facebook, Twitter, YouTube).
- Item 8: I can access the different types of information (news, data, images, videos, statistics, articles, opinions, etc.) I need.
- Item 9: When searching for information in media tools, I can use filtering tools with ease when needed.
- Item 10: I can search for information or materials related to my homework

Technical understand

- Item 11: I can perform several operations (watching, downloading, uploading, sharing, etc.) simultaneously while using media tools.
- Item 12: I can find a friend on social networking sites.
- Item 13: I can share my photos and videos via social networking sites and applications.
- Item 14: I can attach a file or several files during chat or via e-mail.
- Item 15: I can transfer my downloaded files from one device to any other devices.

Critical understand

- Item 16: While using the internet and particularly social networks, I certainly pay attention to how much I reflect my real identity on the web and which personal data I share with others.
- Item 17: When deciding which source to use after making a query to access some information via media tools, I make my decision based on the reliability of the source not on the sequence of results that search engines provide.
- Item 18: I can examine the contents of the same topic presented in different media tools and channels and compare them in terms of the way the topic is addressed and different points of view.
- Item 19: I am aware of the fact that messages communicated through media channels influence people's being persuaded, making decisions, and behavior types.
- Item 20: I can easily identify the content with the purposes like propaganda, manipulation, agitation, and purposeful routing used in media messages.

Create

- Item 21: When needed, I can give reactions in the right way (via audio, video, image, or text) in reply to media messages from different individuals or sources.
- Item 22: I can take pictures, record videos, type text, and arrange these elements to convey a specific message.
- Item 23: I know the methods and ways to complain or inform against unethical, immoral, or unreal data, information sources, and people behaving in these ways.
- Item 24: I can use appropriate means and applications to deliver the messages I create (text, images, video) to the audience.
- Item 25: I can edit photos and videos to convey a specific message.

APPENDIX B

Smartphone addiction scale-short version (SAS-SV)

Item 1: I miss planned work due to smartphone use.

Item 2: I have a hard time concentrating in class while doing assignments, or while working due to smartphone use.

Item 3: I feel pain in my wrists or at the back of my neck while using my smartphone.

Item 4: There is nothing other than smartphone use that is fun to do in my life.

Item 5: I sometimes use my smartphone just because it makes me feel good.

Item 6: My life would be empty without my smartphone.

Item 7: I feel most open to new experiences while using a smartphone.

Item 8: I make sure to bring my smartphone when I use the toilet, even if it's an emergency.

Item 9: I feel like I am better understood over my smartphone than I am in person.

Item 10: I feel more relieved when going to bed if I have my smartphone with me.