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THE INFLUENCE OF STUDENTS' SELF-CONTROL AND SMARTPHONE E-LEARNING READINESS ON SMARTPHONE-CYBERLOAFING

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ABSTRACT

Aim/Purpose — This research aims to empirically investigate and answer the following research questions: Do students' self-control and smartphone e-learning readiness influence smartphone-cyberloafing, and does gender play a role in this relationship?

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Background	Research indicates that many students' learning time is wasted due to cyberloafing, which involves non-course-related activities on their digital devices. Smartphones present a more significant potential for distracting learners than other technological instruments because of their availability, ease of access, and user-friendly interface. The issue of cyberloafing presents a notable challenge in both traditional (in-person) learning environments and online e-learning settings. However, insufficient relevant contributions have been made.
Methodology	An online survey strategy was applied using a self-administered questionnaire technique for data collection. The investigation involved 477 students participated from four universities in Jordan. The partial least squares structural equation modelling (PLS-SEM) method was used to validate the research model and test relationships.
Contribution	This study is considered one of the first studies concerned with cyberloafing in e-learning environments; it could be the first one in the Arab world. It provides empirical evidence that supports relevant literature and contributes to the problem-solving of cyberloafing. Also, it provides an excellent direction for future empirical contributions.
Findings	The findings reveal that students' self-control and smartphone e-learning readiness could significantly reduce smartphone-cyberloafing activities of higher education students. However, no significant influence was found on gender in smartphone-cyberloafing. This study offers significant contributions to both theory and practice in education. Theoretically, it advances the understanding of self-control in mitigating smartphone-cyberloafing and highlights the importance of e-learning readiness, enriching the framework for digital student behaviour. It provides actionable insights for educational institutions, policymakers, and educators to address smartphone-cyberloafing by developing interventions that enhance self-control and e-learning readiness. Recommendations include workshops, engaging online activities, learning analytics, faculty training, collaboration with stakeholders, and policies promoting responsible smartphone use. These measures aim to create a productive e-learning environment and improve the overall academic experience.
Recommendations for Practitioners	Relevant institutions can develop targeted interventions and support mechanisms to mitigate smartphone-cyberloafing and enhance students' engagement in e-learning. These may include workshops or resources aimed at improving self-control and e-learning readiness, equipping students with the skills needed to manage their digital learning environments effectively. Educational policies should promote responsible smartphone use as a part of e-learning, encouraging schools and educators to incorporate smartphone-based learning strategies into their curricula and create guidelines for responsible use.
Recommendations for Researchers	It is possible to replicate the model while conducting multiple group analyses based on these individual differences .
Impact on Society	The findings of this research may create a more conducive and productive e-learning environment, ultimately improving the academic experience for all students. Such a study could substantially contribute to the sustainability of the education system and society as a whole.

Future Research	Future works could prioritize examining cyberloafing behaviours occurring within asynchronous learning settings. Furthermore, future studies could incorporate variables about learners' differences into the model. Finally, it is essential to note that the results are restricted to a single country. Conducting investigations across multiple countries in future endeavours could yield more precise and accurate outcomes.
Keywords	smartphone e-learning, cyberloafing, smartphone-cyberloafing, students' self-control, e-learning readiness, gender differences

INTRODUCTION

The change towards utilizing digital technologies in learning is necessary due to its attractive outcomes in facilitating accessibility, improving quality, and increasing the efficiency of education (Al-Adwan, Alsoud, et al., 2024; Mathani et al., 2024; Wahshat et al., 2024). It is also considered a suitable alternative in some emergency cases. One of the best examples is when educational institutions worldwide incorporated e-learning amidst the COVID-19 pandemic. Smartphones play a significant role in this regard since they offer access to learning electronically (e-learning) anywhere, anytime (Akar & Coskun, 2020; Al-Adwan, Al-Adwan, & Berger, 2018; Al-Adwan & Al-Debei, 2024; Ozdamli & Ercag, 2021).

Using smartphones in e-learning (smartphone e-learning) has been studied by numerous authors; however, there is a dearth of knowledge on how smartphones may influence the learning process itself (Al-Adwan, Al-Madadha, & Zvirzdinaite, 2018; Habibi et al., 2023; Wu et al., 2020). Pertinent literature underscores that cyberloafing poses a substantial obstacle to effective learning and is among the most significant challenges of smartphone e-learning (Blanchard & Henle, 2008; V. K. Lim & Chen, 2012; Saritepeci, 2020). Research indicates that many students' learning time is wasted due to cyberloafing, which involves non-course-related activities on their digital devices. Compared to other technological instruments, smartphones present a greater potential for distracting learners because of their availability, ease of access, and user-friendly interface (Y. Chen et al., 2021; El-Qirem et al., 2022; V. K. Lim, 2002; McCoy, 2020). The issue of cyberloafing presents a notable challenge in both traditional (in-person) learning environments and online e-learning settings. However, insufficient relevant contributions have been conducted (Minaz & Çetinkaya Bozkurt, 2017; Syrek et al., 2018; Wu et al., 2020; Zhou et al., 2021). Paying attention to the threats of cyberloafing in e-learning came from some important statistics in the business industry. For instance, Statista (2019) found that 52% of surveyed respondents checked their email during work hours. According to Udemy (2018), 62% of employees waste approximately 60 minutes daily on personal phone use. Additionally, 60% of people admitted they couldn't get through the workday without checking social media, with two-thirds indicating Facebook as the biggest distraction. Moreover, 36% of millennials and Gen Z reported spending two or more hours per workday on personal phone activities. Finally, researchers at the University of Nevada estimated that cyberloafing costs businesses $85 billion annually in lost time (Stokel-Walker, 2020).

In this context, several strategies have been proposed to address cyberloafing. For example, clear internet usage policies should be established, and monitoring tools should be implemented to track online activities and block non-work-related websites. Also, creating an engaging environment and offering training programs and awareness campaigns can help reduce cyberloafing. Furthermore, several critical factors have been suggested to successfully implement smartphone e-learning. These include sufficient technological capacity, students' e-learning readiness, engaging and interactive content, structured learning pathways, self-control, social interaction and collaboration, feedback and support, and clear guidelines (Alfalah, 2023; Alrasheedi & Capretz, 2013; Cochrane, 2010; Fabito, 2017; Haleem et al., 2022; Krotov, 2015; Rohayani, 2015; Tang et al., 2021; Widodo et al., 2020). However, in terms of the cyberloafing problem, there is a need for further empirical contributions.

Among these success factors of smartphone e-learning, and based on Behaviourism theory, students' self-control and smartphone e-learning readiness (SER) are expected to have a significant relationship with smartphone-cyberloafing as they all relate to students' psychological behaviours and personal habits. These two factors are rooted in behaviourist principles and foster a conducive psychological environment for students, promoting a sense of autonomy, efficacy, and a positive mindset toward academic pursuits (Watson, 2017). As students consistently exercise self-control and draw upon their readiness, they are more likely to exhibit resilient psychological behaviours, positively impacting their overall well-being and academic success. Also, they could lead to positive behaviours by improving emotional resilience, reducing anxiety, and increasing concentration, confidence, and adaptability (Al-Adwan, Li, et al., 2023; Boghossian, 2006; Dajani & Hegleh, 2019; Staddon, 2014). However, based on our extensive literature review, the influence of these two factors - together - on smartphone-cyberloafing has never been tested before.

Therefore, this study aims to contribute significantly by empirically examining the influence of students' self-control and smartphone e-learning readiness (SER) on smartphone-cyberloafing. Moreover, since several authors argue that males and females have different levels of cyberloafing behaviours (see the section on Gender Effect), gender differences were considered in the study to give more detailed results. Such a study could substantially contribute to the sustainability of the education system and society as a whole (Khalifeh, Farrell, & Al-edenat, 2020; Khalifeh, Farrell, Alrousan, et al., 2020). Figure 1 presents the research model.

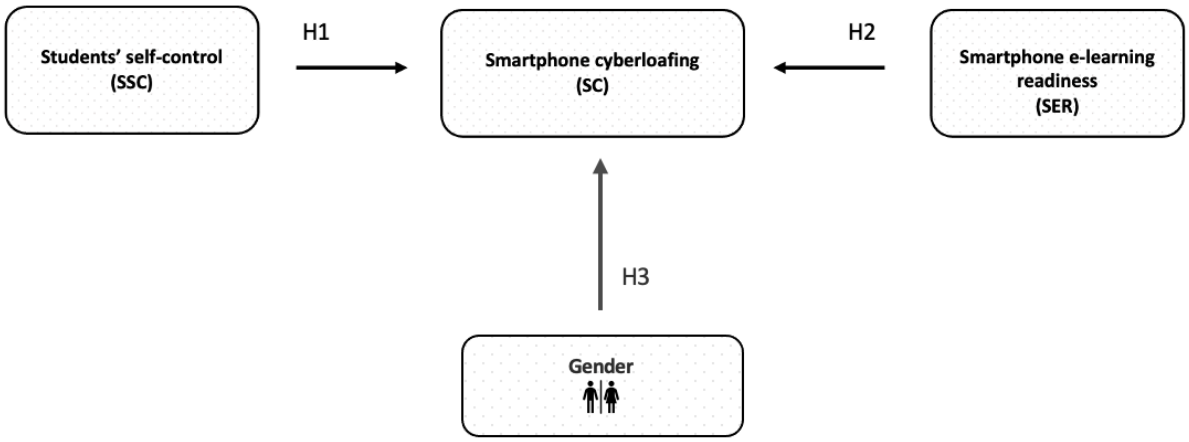

Figure 1. Research model

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

SMARTPHONE-CYBERLOAFING

In a professional environment, cyberloafing refers to improper Internet utilisation for personal needs during working hours (Akbulut et al., 2017). Likewise, in education, cyberloafing can be defined as the use of the internet for private motives (non or outside academic purposes) during scheduled lesson periods (Demirtepe-Saygılı & Metin-Orta, 2021). Current research has revealed that students occasionally indulge in cyberloafing using their smartphones while attending classes (Alanoglu & Karabatak, 2021).

Smartphone-cyberloafing involves activities such as engaging in social and virtual networks, browsing websites, and using smartphones for entertainment purposes (Blau et al., 2006; Ozdamli & Ercag, 2021). It also includes checking email, reading or liking tweets, doodling (drawing pictures), chatting and retweeting, downloading apps and games, and watching videos (Masadeh, 2021; Varol & Yıldırım, 2019).

Within the realm of education, students' engagement in cyberloafing behaviours can have implications for their personal and academic growth, subsequently affecting their academic achievements (Durak, 2020). Smartphone-cyberloafing is linked with smartphone addiction (Hadlington & Parsons, 2017; Turan et al., 2021) and negatively impacts e-learning by causing distractions, reducing attention spans, promoting multitasking behaviour, and inhibiting self-regulation. Therefore, students find it challenging to focus on learning activities, have shorter attention spans, switch between tasks frequently, and struggle to control their smartphone usage. As a result, their ability to concentrate, engage deeply in learning, and effectively utilise e-learning tools and resources is compromised (Ataş & Çelik, 2019; Windeler et al., 2017).

Both e-learning and traditional learning are reported to be significantly impacted by cyberloafing (Coskun & Gökçearslan, 2019; Gökçearslan et al., 2016). Still, in e-learning environments, there is a scarcity of contributions concerning the cyberloafing behaviours of students (Gökçearslan et al., 2023; Y. Zhang et al., 2022). Therefore, conducting empirical studies on e-learning and its tools and software systems can significantly contribute to developing the skills and knowledge needed for sustainable practices and fostering a culture of social responsibility (Khalifeh et al., 2023).

Students' Self-Control and Smartphone-Cyberloafing

Self-control refers to exerting greater control over one's actions and behaviours while engaging in work tasks and the ability to change positively (Moffitt et al., 2011; Schmeichel et al., 2011; Tangney et al., 2004). It is a critical trait for a successful person (Cascio, 2003; Hofmann et al., 2014). By practising self-control, individuals can maintain focus on their assigned responsibilities and perform their duties more effectively (de Ridder et al., 2012; Goleman, 2017). People who engage in self-control are proactive in setting and achieving their own goals, often surpassing the performance of others (Galla & Duckworth, 2015; Gerber et al., 1995). Such individuals actively create plans for themselves and try to accomplish their objectives (Azizli et al., 2015; Muraven et al., 2008; Prenda & Lachman, 2001).

In the context of this research, self-control can be described as the ability to effectively regulate personal behaviours, ideas, views, emotions, thinking, and resources to achieve personal goals and maintain well-being. It is a dynamic and ongoing process that requires individuals to monitor their internal thoughts and dominate their external actions.

Relevant theories suggest that a lack of self-control can lead to behavioural problems (Baumeister et al., 2018; Gottfredson & Hirschi, 1990). Some studies, for example, Restubog et al. (2011), Wagner et al. (2012), and Rahimnia and Mazidi (2015), declare that higher self-control can reduce cyberloafing activities. Likewise, Baumeister et al. (2000) and S. J. Kim and Byrne (2011) suggest that persons with low self-control have a higher probability of being involved in cyberloafing. Furthermore, several researchers, such as Li et al. (2014), Akın et al. (2015), Prasetiawan (2016), and Fadil et al. (2019) found a significant negative relationship between self-control and technology addiction (addiction to online gaming, internet browsing, social media, etc.), which is strongly linked with cyberloafing. Therefore, it is conceivable to propose that students' self-control could significantly reduce smartphone-cyberloafing activities. This is nearly similar to Prasad et al. (2010), who state that self-controlled individuals, in terms of emotion regulation and goal orientation, are less engaged in cyberloafing. Thus, the following hypothesis was proposed:

H1. Students' self-control significantly influences smartphone-cyberloafing.

Students' E-Learning Readiness and Smartphone-Cyberloafing

E-learning readiness refers to students' capability to engage effectively with new technologies in the learning process (Hashim & Tasir, 2014). It encompasses various elements, including learner control, motivations towards e-learning, and self-efficacy in utilising computers and online connectivity (Durak, 2017; Hung et al., 2010; Widodo et al., 2020). Therefore, it is considered crucial for the success of online educational programs (Rohayani, 2015). Even though numerous studies have been done on

online education, the extent of students' readiness to engage in online classes remains poorly understood (Tang et al., 2021).

In traditional education (face-to-face/frontal), students often use their smartphones or tablets to go online during classes (Yuwanto, 2018). Recent research revealed that around 20% of college students utilise their digital devices for cyberloafing (McCoy, 2020). Despite ongoing investigations into cyberloafing and its impact on learning, there is limited knowledge about such behaviours in e-learning. Therefore, it is essential to study students' readiness for e-learning and identify factors contributing to their cyberloafing activities, like their beliefs, interests in the course, self-efficacy, and cognitive characteristics (Al-Adwan, Nofal, et al., 2022; R. Yılmaz & Yurdugül, 2018).

Previous studies have indicated that students' readiness in motivation, technological background, and e-learning capability can influence their cyberloafing behaviours (Al-Adwan & Khdour, 2020; Durak, 2020; Varol & Yıldırım, 2019). Additionally, in a particular study, it was found that smartphones have the most vital relationship with e-learning readiness compared to other technologies (Firat & Bozkurt, 2020). Ravizza et al. (2017) conclude that utilising technologies for non-academic purposes in the learning process can confuse and disturb students and undermine their motivation to learn. Based on these observations, we hypothesised the following:

H2. Smartphone e-learning readiness significantly influences smartphone-cyberloafing.

Gender Effect

Males and females have been found to have different behaviours and perceptions about new technologies, which influence their usage and engagement levels with these technologies (Çelik, 2011; Dewi et al., 2020; Lu et al., 2005). Several authors have pointed out the potential influence of gender differences in relevant research. For instance, V. K. Lim and Chen (2012), K. Kim et al. (2016), Akbulut et al. (2017), Dursun et al. (2018), Saritepeci (2020), and Metin-Orta and Demirtepe-Saygılı (2023) have considered gender differences in their studies about cyberloafing and found significant results.

Similarly, various authors disclosed that males and females have different levels of self-control in terms of smartphone usage (Busch & McCarthy, 2021; B. Chen et al., 2017; De-Sola Gutiérrez et al., 2016; J. Lee & Kim, 2018; León-Mejía et al., 2021; Rodríguez-García et al., 2020; Taywade & Khubalkar, 2019; Totten et al., 2005) and, therefore, could significantly influence their cyberloafing activities (Liani et al., 2021; Ozler & Polat, 2012; Peng, 2022; Rahayuningsih & Putra, 2018; Restubog et al., 2011; H. Zhang et al., 2015; Zhou et al., 2021).

Also, different levels of (e)learning readiness were spotted between male and female students (Adams et al., 2018; Atkinson & Blankenship, 2009; Chung et al., 2020; Hung et al., 2010; Naresh et al., 2016; Reio & Davis, 2005; Slater et al., 2017; Tang et al., 2021), which may significantly affect their cyberloafing behaviours as well (Durak, 2020; Gökçearslan et al., 2023; Gözümi et al., 2020; Gürbüz et al., 2023).

Baturay and Toker (2015) conclude that amongst the tested demographic variables, gender was identified as the most influential factor affecting cyberloafing behaviour. Based on these findings, we hypothesised the following:

H3. Gender significantly influences smartphone-cyberloafing.

Research Methods

Investigation Procedure (Participants and Data Collection Tool)

This study involved 500 students from four universities who have online modules. The sampling technique used was purposive sampling, where students were specifically targeted based on their en-

rolment in online modules. The use of purposive sampling allowed the researchers to specifically target participants who were relevant to the study, in this case, university students enrolled in online modules. This sampling technique ensured that the data collected was from a population directly relevant to the research topic, enhancing the validity and applicability of the findings.

Students were invited to complete a prepared 15–20-minute online survey. Invitations were extended via WhatsApp groups or through the university e-learning portal, and participation was voluntary. Twenty-three surveys were deemed invalid and excluded due to missing data and suspicious response patterns. A total of 477 valid surveys remained after examining them against "missing statistics, suspicious response patterns (e.g., straight or diagonal answers), and outliers" (Hair et al., 2017). Approval was obtained from the Ethics Committee of each university.

A clarification message with directions about the research topic was sent with the survey. The first part of the questionnaire (four questions) was for collecting demographic data, and the second part (23 questions) was utilized for the model variables. Additionally, to inspect the students' attention and ensure their response patterns, a trap question was used in the second part of the questionnaire, asking the students not to choose any answer. If any answer was given to the trap question, the entire questionnaire was removed from the data set. The total number of questions was 28.

VARIABLES AND MEASURES

The research model (Figure 1) consists of two independent variables (IVs), which are students' self-control (SSC) and smartphone e-learning readiness (SER), and one dependent variable (DV), which is smartphone-cyberloafing (SC). Gender was applied as a control variable. The operationalisation of variables was based on previously developed and validated measures (see Appendix), as clarified in the following sections.

Students' self-control (IV)

The operationalisation of students' self-control variable (SSC) was based on seven items adapted from the Tangney et al. (2004) Self-Control Scale. These items focus on controlling emotions, thoughts, impulses, habit-breaking, and performance regulation. For instance, items include "People would say that I have iron self-discipline," "I am reliable," "I refuse things that are bad for me," and "I never allow myself to lose control." Responses were based on a five-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree). The higher response scores indicate higher levels of students' self-control.

Smartphone e-learning readiness (IV)

The operationalisation of the smartphone e-learning readiness variable (SER) was based on seven items adapted from the MLR (Mobile Learning Readiness) scale of Lin et al. (2016). The scale items include, for example, "I like mobile learning systems," "I can direct my own learning progress," and "I feel confident in performing the basic functions of mobile learning systems." Responses were based on a five-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree). The higher response scores indicate higher levels of smartphone e-learning readiness.

Smartphone-cyberloafing (DV)

Smartphone-cyberloafing (SC) was operationalised based on nine items adapted from the scales of Blau et al. (2006) and Akbulut et al. (2016). The items include, for instance, "I visit online shopping sites," "I read tweets," "I chat with friends," "I watch videos online," and "I check my non-class-related email from my smartphone during lessons." Responses were based on a five-point Likert scale of cyberloafing frequency (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always).

Gender

Gender was positioned as a control variable in the model to examine differences in influence between males and females. Controlling gender differences is helpful to understand whether the relationship between IVs and DV holds across different genders while minimising gender-related biases.

It was done by assigning numerical values (0 for male, 1 for female) to the student's response (Khalifeh, 2020; K. Kim et al., 2016; P. K. Lim et al., 2021).

Data analyses

Partial least squares structural equation modeling (PLS-SEM) was applied using SmartPLS 4.0. software to examine the collected data, validate the measures, and test the variables' relationships (Hair et al., 2017). PLS-SEM is an effective technique for analysing complex models (Sarstedt et al., 2020). The analysis was accomplished in two phases: first, examining the measurement model, and second, testing the structural model and relationships.

RESULTS

Demographic data and descriptive statistics about participants are presented in Table 1. Of the respondents, 42.3% were males, and 57.7% were females, with a 21.61-year age average. Their levels of using technology were medium and high in general (mean = 2.41 out of 3), and their smartphone usage per day was 5.298 hours.

Table 1. Demographic data

Demographics		*f*	%
Gender	Male	202	42.3
	Female	275	57.7
	Mean	Sum of squares	
Age	21.61	6.23	
Level of using technology	02.41	0.55	
Smartphone usage per day	05.30	2.71	

Frequency (*f), Percentage (%).*

In Table 2, the results show that the engagement level of male students in smartphone-cyberloafing (SC) is slightly higher (overall mean 3.88) than that of females (overall mean 3.52). It should be noted that the overall mean (known as the mean of means or grand mean) was calculated based on the first 202 male and female respondents to prevent any potential bias or effect on the results from variations in group sizes. It should be noted that equalising the sample size was done only in this part of the analysis. In the remaining parts of the analysis, we have included all data.

Table 2. Smartphone-cyberloafing (SC) level based on students' gender

Items	Males		Females		*f**
	Mean	SD	Mean	SD	
SC1	3.60	0.93	3.22	0.96	Males N= 202 Females N= 202
SC2	3.55	0.91	2.96	0.88	
SC3	3.85	0.81	3.31	0.83	
SC4	3.70	0.82	3.28	0.85	
SC5	3.65	0.79	3.18	0.81	
SC6	3.75	0.71	3.69	0.69	
SC7	4.05	0.68	4.11	0.65	
SC8	3.95	0.82	4.04	0.79	
SC9	4.20	0.74	3.93	0.71	
Overall Mean	3.88		3.52		

*Based on the first 202 students/respondents from males and females.

THE RELIABILITY AND VALIDITY OF THE MEASUREMENT MODEL

Based on Hair et al. (2017), evaluating the measurement model included examining individual "indicator reliability (outer loadings), internal consistency reliability (Cronbach's alpha and composite reliability), convergent validity based on average variance extracted (AVE), and discriminant validity (cross-loadings and Fornell-Larcker criterion)." The results are in Tables 3, 4, and 5.

Outer loading values for individual indicator reliability must be greater than 0.70, and values of AVE must be above or equal to 0.50 (Hair et al., 2017). As presented in Table 3, all outer loadings values are above 0.70, and in Table 4, all AVE values are greater than 0.50. Also, in Table 4, the values of Cronbach's alpha and composite reliability established the internal consistency reliability, all above 0.70, as recommended by Sarstedt et al. (2014).

Table 3. Outer loadings with cross-loadings

Constructs	Items	SSC	SER	SC
Students' self-control (SSC)	SSC1	0.770	0.032	-0.241
	SSC2	0.737	0.050	-0.307
	SSC3	0.733	0.224	-0.348
	SSC4	0.748	0.127	-0.127
	SSC5	0.723	0.037	-0.254
	SSC6	0.827	0.062	-0.101
	SSC7	0.723	0.041	-0.165
Smartphone e-learning readiness (SER)	SER1	0.072	0.740	-0.306
	SER2	0.036	0.772	-0.244
	SER3	0.028	0.732	-0.258
	SER4	0.071	0.725	-0.347
	SER5	0.005	0.746	-0.127
	SER6	0.027	0.727	-0.106
	SER7	0.091	0.825	-0.161
Smartphone-cyberloafing (SC)	SC1	-0.371	-0.268	0.822
	SC2	-0.302	-0.172	0.865
	SC3	-0.271	-0.334	0.765
	SC4	-0.207	-0.221	0.827
	SC5	-0.234	-0.214	0.794
	SC6	-0.375	-0.222	0.822
	SC7	-0.267	-0.242	0.787
	SC8	-0.317	-0.251	0.826
	SC9	-0.092	-0.117	0.741

Finally, the discriminant validity was established through testing the cross-loadings and the Fornell-Larcker criterion. As shown in Table 3, the outer loading of an item on the associated variable is higher than any of its correlation (cross-loadings) with other variables. Likewise, in Table 5, the square root value of the AVE of each variable is greater than the correlation with the other variables (Fornell & Larcker, 1981; Hair et al., 2017; Khalifeh, 2020). Based on the results above, it is evident that the measurement model is validated.

Table 4. Construct reliability and validity

Variable	No. of items	Cronbach's alpha (α)	Composite reliability	Average variance extracted (AVE)
SSC	7	0.828	0.872	0.566
SER	7	0.826	0.868	0.561
SC	9	0.885	0.904	0.642

Table 5. Fornell-Larcker criterion

Variables	SSC	SER	SC
SSC	0.752		
SER	0.142	0.748	
SC	-0.307	-0.236	0.801

Examining the Structural Model (Hypotheses Testing)

Following validation of the measurement model, the relationships of the structural model were examined, and estimates were based on 1,000 bootstrap samples. We ran the analysis two times; the first

(Table 6) was without the control variable (gender), and the second (Table 7) was with the inclusion of it.

As shown in Table 6, there is a negative and significant relationship between SSC and SC (p-value < 0.05, β-value = -0.389). Also, a similar relationship is between SER and SC (p-value <0.05, β-value = -0.479). Both hypotheses were supported (H1 and H2), and an apparent inverse relationship exists between the two independent variables (IVs) and the dependent variable (DV). This means that the more students' self-control (SSC), the less smartphone-cyberloafing (SC), and the more smartphone e-learning readiness (SER), the less smartphone-cyberloafing (SC).

The inclusion of gender as a control variable in the second analysis (Table 7) had no significant effect on the relationships; the results for H1 and H2 were almost the same as in Table 6. Also, it was found that the relationship between gender and smartphone-cyberloafing (H3) is not significant (p-value > 0.05, β-value = 0.079).

However, since H1 and H2 had almost the same results in both tests, it can be deduced that students' self-control (SSC) and smartphone e-learning readiness (SER) can significantly reduce smartphone-cyberloafing (SC) activities.

Table 6. Hypotheses testing 1

Hypothesis	Relationship	β-Value	P-Value	Significance*	Relationship type
H1	SSC -> SC	-0.389	0.000	Yes	Negative
H2	SER -> SC	-0.479	0.007	Yes	Negative

Notes: *p < 0.05, control variable (Gender) not included

Table 7. Hypotheses testing 2

Hypothesis	Relationship	β-Value	P-Value	Significance*	Relationship type
H1	SSC -> SC	-0.391	0.000	Yes	Negative
H2	SER -> SC	-0.480	0.011	Yes	Negative
H3	Gender -> SC	0.079	0.277	No	-

Notes: *p < 0.05, control variable (Gender) included

DISCUSSION

This research set out to empirically examine the influence of students' self-control and smartphone e-learning readiness on smartphone cyberloafing while considering the effect of gender. The outcomes reveal a significant negative relationship between students' self-control and smartphone-cyberloafing (H1). Likewise, a significant negative relationship exists between smartphone e-learning readiness and smartphone-cyberloafing (H2). This inverse relationship means that students with more self-control have less smartphone-cyberloafing. Also, students with more smartphone e-learning readiness have less smartphone-cyberloafing.

For H1, the findings of this research are consistent with previous studies. For instance, Rahimnia and Mazidi (2015) reported that the cyberloafing behaviours of employees could be reduced by developing their self-control abilities. Also, H. Zhang et al. (2015) show that individuals with a greater sense of self-control exhibit a reduced inclination to participate in cyberloafing activities. They were convinced that the self-control ability of employees can play a significant role in reducing their cyberloafing activities. In addition, the results reported by Yang et al. (2019) and Du and Zhang (2022) suggest that people with elevated levels of self-control can effectively manage their internal impulses, regulate their emotions and behaviours rationally, and successfully pursue their objectives. Consequently, they exhibit rational control over internet usage patterns and are unlikely to have internet addiction symptoms. According to Gottfredson and Hirschi (1990), the lack of self-control ability is proposed as a contributing factor to the development of behavioural issues. Zhou et al. (2021) conclude that students with high self-control traits are less likely to engage in cyberloafing.

However, for H2, our findings are inconsistent with some previous studies. Gözümi et al. (2020) found a significant and positive correlation between cyberloafing and mobile learning readiness. Other studies, such as Hayıt and Donmez (2016) and Durak (2020), have also found a correlation between online-learning motivation and cyberloafing. Additionally, some aspects of e-learning readiness, including behavioural control (Olufadi, 2015), learning motivation, and self-discipline in managing personal habits, have been linked with smartphone-related cyberloafing (Koay & Poon, 2022). The readiness of students for e-learning could potentially serve as an indicator (or predictor) for their likelihood of engaging in cyberloafing behaviours. On the other hand, in the empirical study of Gökçearslan et al. (2023), the authors conclude that cyberloafing could be reduced by increasing the e-learning readiness of learners.

Regarding gender differences in cyberloafing levels, it was found that male students engaged in smartphone cyberloafing slightly higher than females. This finding in our study is consistent with the majority of relevant studies, such as Vitak et al. (2011), V. K. Lim and Chen (2012), Andreassen et al. (2014), F. G. K. Yılmaz et al. (2015), Akbulut et al. (2017), Dursun et al. (2018), Saritepeci (2020), and Toker and Baturay (2021). Nevertheless, for H3, it was found that gender has no significant influence on smartphone-cyberloafing. In this regard, our findings are in line with Askew et al. (2014), Gökçearslan et al. (2018), Tanrıverdi and Karaca (2018), Durak (2020), Saritepeci (2020). On the other hand, these findings are inconsistent with Betts et al. (2014), Baturay and Toker (2015), Akbulut et al. (2017), and Metin-Orta and Demirtepe-Saygılı (2023), who indicated that gender has a significant influence on cyberloafing.

Finally, it should be noted that the discrepancy in the results with some relevant studies can be attributed to various factors. These include differences in participant demographics, sample characteristics, measurement instrument variations, research design and methodology disparities, contextual factors, and technological changes over time. These reasons are crucial for interpreting and contextualising the results. Also, this confirms the need for other experimental studies of this dilemma. However, based on our results, it can be concluded that students' self-control and smartphone e-learning readiness could significantly reduce smartphone-cyberloafing activities.

CONCLUSION

The present study aimed to empirically examine the influence of students' self-control and smartphone e-learning readiness on smartphone-cyberloafing behaviours, taking into account the potential effect of gender. This research represents one of the pioneering efforts to investigate cyberloafing in e-learning environments, particularly within the context of the Arab world.

The findings of this study contribute to the existing literature by providing empirical evidence that supports the relationships between self-control, smartphone e-learning readiness, and smartphone-cyberloafing tendencies among students. Specifically, the results indicate that lower levels of self-control and higher levels of smartphone e-learning readiness are associated with an increased likelihood of engaging in cyberloafing behaviours during online learning activities.

Furthermore, this research highlights the significant role of gender in moderating these relationships, suggesting that the influence of self-control and smartphone e-learning readiness on cyberloafing may differ between male and female students. These findings offer valuable insights into the factors that contribute to cyberloafing in e-learning environments and underscore the importance of considering individual characteristics and contextual factors in addressing this issue.

While this study provides a foundation for understanding smartphone-cyberloafing in e-learning contexts, it also paves the way for future empirical contributions. By identifying the key factors influencing cyberloafing behaviours, researchers and educators can develop targeted interventions and strategies to mitigate these distractions and enhance student engagement and learning outcomes in digital learning environments.

Overall, this research contributes to the problem-solving of cyberloafing in e-learning by offering empirical evidence and providing an excellent direction for future investigations. It underscores the need for continued research in this area, particularly within diverse cultural and educational contexts, to develop a comprehensive understanding of the factors influencing cyberloafing and effective strategies to address this challenge in the rapidly evolving landscape of digital education.

IMPLICATIONS

Theoretical implications

This study offers significant theoretical contributions to psychology and education. First, it advances the understanding of self-control in the context of smartphone-cyberloafing, emphasising its role in reducing this detrimental behaviour. The negative relationship between self-control and smartphone-cyberloafing aligns with theories of impulse control and self-regulation, shedding light on the applicability of these theories in the digital learning environment. Additionally, the study underscores the relevance of e-learning readiness, a concept not extensively explored in existing literature. The negative relationship between e-learning readiness and smartphone-cyberloafing underscores the importance of preparedness for effective digital education. These findings enrich the theoretical framework for understanding student behaviour in the digital age.

Practical implications

The practical implications of this research are of paramount importance to educational institutions, policymakers, and educators. To effectively address smartphone-cyberloafing behaviours and promote responsible technology use in e-learning environments, institutions can develop targeted interventions and support mechanisms to mitigate cyberloafing and enhance students' engagement. These may include workshops or resources aimed at improving self-control and e-learning readiness, equipping students with the skills needed to manage their digital learning environments effectively. Additionally, designing engaging and interactive online learning experiences, utilizing learning analytics and monitoring tools, offering faculty training, and fostering collaboration with stakeholders like parents and technology providers are crucial steps. Educational policies should also promote responsible smartphone use as a part of e-learning, encouraging schools and educators to incorporate smartphone-based learning strategies into their curricula and create clear guidelines for appropriate use. By acting on these practical implications, institutions can create a more conducive and productive e-learning environment, ultimately improving the academic experience for all students. This involves providing self-regulation training, digital literacy education, personalized readiness assessments, engaging online activities, monitoring mechanisms, faculty support, and collaborative strategies with various stakeholders.

Limitations and direction for future research

The authors of this research acknowledge certain limitations in the present study and possibilities for future investigation. First, all variables were measured using self-report measures, and relying solely on this method may have impacted the outcomes. Future studies could incorporate additional indicators, such as smartphone activity records or computer usage logs, to assess student cyberloafing more objectively. Additionally, future research could extend the study duration for a longer period to capture potential changes or patterns over time.

Second, this study primarily focused on correlation and cannot establish a causal effect relationship. The lack of mediating variables also prevents the researchers from revealing the underlying mechanisms that explain the relationships between the variables. To address these limitations, future works may include potential mediating variables and ensure appropriate time intervals between measurements to assess the influence more accurately and establish causality.

Third, future works could prioritise examining cyberloafing behaviours occurring within asynchronous learning settings, as this study focused on online modules. Furthermore, future studies could incorporate variables about learners' differences, such as learning styles, self-regulation abilities, or

personality traits, into the model. It is possible to replicate the model while conducting multiple group analyses based on these individual differences, which could provide valuable insights into how various learner characteristics influence cyberloafing behaviours.

Fourth, the generalizability of the findings may be limited, as the study was conducted within a specific cultural and educational context. Conducting investigations across multiple countries and diverse educational settings in future endeavours could yield more precise and accurate outcomes, enhancing the external validity and applicability of the findings.

Finally, future research could explore the potential impact of different instructional design strategies or technological interventions on mitigating cyberloafing behaviours in online learning environments. By identifying effective approaches to reduce cyberloafing, researchers and educators could develop practical solutions to enhance student engagement and learning outcomes in digital learning contexts.

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APPENDIX

Students' self-control

Please indicate your level of agreement with each statement by selecting one of the response options, ranging from strongly disagree (1) to strongly agree (5).		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
5	I am reliable	1	2	3	4	5
6	I am good at resisting temptation.	1	2	3	4	5
7	I refuse things that are bad for me.	1	2	3	4	5
8	I never allow myself to lose control.	1	2	3	4	5
9	People can count on me to keep on schedule.	1	2	3	4	5
10	People would say that I have iron self-discipline.	1	2	3	4	5
11	I am able to work effectively toward long-term goals.	1	2	3	4	5

Smartphone e-learning readiness

Please indicate your level of agreement with each statement by selecting one of the response options, ranging from strongly disagree (1) to strongly agree (5).		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
12	I feel confident in performing the basic functions of mobile learning systems.	1	2	3	4	5
13	I feel confident in using mobile learning systems to effectively communicate with others.	1	2	3	4	5
14	I feel confident in knowing all the special keys and functions contained in a mobile learning system.	1	2	3	4	5
15	I like mobile learning systems.	1	2	3	4	5
16	Mobile learning systems make me more efficient in my studying.	1	2	3	4	5
17	I can direct my own learning progress.	1	2	3	4	5
18	Please do not choose any answer or number here, go to 19	1	2	3	4	5
19	In my studies, I set goals and have a high degree of initiative.	1	2	3	4	5

Smartphone-cyberloafing

During your online class through your smartphone, please indicate your level of agreement with each statement by selecting one of the response options, ranging from strongly disagree (1) to strongly agree (5).		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
20	I check job advertisements.	1	2	3	4	5
21	I check online sports sites.	1	2	3	4	5
22	I download or use applications (Mobile banking, sports, games, social media applications, etc.).	1	2	3	4	5
23	I check my non-class-related e-mails from my smartphone during lessons.	1	2	3	4	5
24	I watch videos online.	1	2	3	4	5
25	I chat with friends.	1	2	3	4	5
26	I read, like, share, or comment on online content (posts, tweets, photos, videos, etc.).	1	2	3	4	5
27	I visit online shopping sites.	1	2	3	4	5
28	I play online games	1	2	3	4	5

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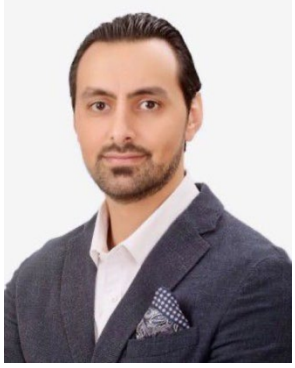

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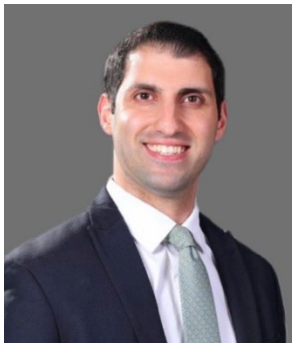

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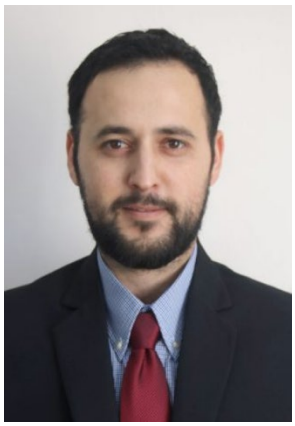

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