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RESEARCH ARTICLE

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Related research between college students' mobile game addiction, mobile self-efficacy, and academic performance in Taiwan

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Abstract

As a novel type of mobile game, addictive behavior has attracted the attention of researchers due to its possible negative impacts on several forms of psychological problems. In this research, we tested the relationship between academic performance, mobile game addiction (MGA), and mobile self-efficacy among undergraduates in Taiwan. An academic model has been suggested from the hypotheses and using a sample of 739 college students by estimating the structural equation modeling. This result discloses that college students are an at-risk swarm for the MGA. We realized that MGA was negatively connected with academic performance and mobile self-efficacy, exhibiting a positive relationship between the latter two. Further analysis on age, place of stay, and the duration of playing mobile games distinction was tested in the trajectories from MGA to these psychological health results, and the results revealed that they were significantly associated with MGA. We also dealt with the limitations and recommended that the authorities immediately regard this, and to complete academic goals, college students should refrain from playing mobile games and participate in other forms of healthy entertainment.

KEYWORDS

academic performance, mobile game addiction, mobile self-efficacy

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1 | INTRODUCTION

With the network and mobile technology's rapid advancement, the combination of “network/mobile” and “game” has brought numerous functions that have been shifted to mobile devices, such as smartphones, which particularly have permitted us to seek services and information with relative ease. In regard to substances or modern technologies, separating normal use from abuse or addiction is a challenge. The use of modern technology or substances can sometimes be difficult to distinguish from the abuse or addiction to them. It can also be said that there is a high probability of mobile phone addiction before mobile game addiction (MGA). The Internet gaming industry is monumental, and there are approximately 1 billion online gamers worldwide. In 2020, the global Internet gaming market created approximately $21.1 billion in profit, translating to a record 21.9% rise compared with the previous year. The smartphone has offered a convenient and fast way to seek information and join with others, and because of its interactive nature and multimedia, it has affected a large part of human life today. However, under the influence of people's high adhesion to smartphones, they have developed more functions to reflect the things that cannot be acquired on mobile phones. Nevertheless, what has been the source of the negative impacts of mobile phones on the functioning of daily life, family relations, and emotional health is controlling the scarcity of this emerging technology's adoption and its pathological utilization. Smartphone addiction has become a significant social issue as smartphones are increasingly used in everyday life. Regarding this technology's deep effect on one's lifestyle, especially among young people, there are a couple of surveys on dependency or cell phone addiction or on the psychological and physical results of utilizing cell phones. Technology addictions, such as smartphone and online addictions, are considered nonchemical behavioral addictions involving human–machine interactions. Constant smartphone exploits and smartphone games were related to smartphone addiction, therefore causing more severe mental health dilemmas. According to de la Puente and Balmori (2007), the misuse of cell phones is classified as an addiction that needs to be addressed immediately.

Since social distancing with restricted activities and remote schooling outside the home started in March 2020, the Internet game addiction rate has been steadily rising. Young people are utilizing gaming as a distraction to isolate and combat loneliness. Former researchers on Internet gaming disorder have concentrated on habitual Internet game addiction that was primarily based on a desktop computer (Wang et al., 2019). Game developers are implementing some distinct modes and schemes to retain players glued to their mobile devices and support their addiction, as mobile games are specifically characterized by portability, immediacy, and accessibility (Lee & Kim, 2017), and players will expend more time in the game and/or invest more money to unloosen the same kind of feelings. According to the Bahamut forum news survey, the time spent playing mobile games in 2020 will be 284 billion hours, which is the fastest growth; in 2020, global mobile game consumption will reach 81 billion US dollars. According to the 2020 survey report of Taiwan's National Institutes of Health, students' mobile phone addiction status will increase with the usage of mobile phones because of their willingness to spend on mobile games. However, students' excessive addiction is not only “internet addiction,” but it may also be “gaming addiction.” According to the World Health Organization, in 2018, it is officially announced that “internet game addiction” would be included in mental illness, causing doubts and worries worldwide. The ambiguity of the definition of mobile phone addiction mainly lies in the confusing usage of the concepts of mobile phone addiction, Internet addiction, and mobile phone dependence. Some who undergo game addictions are also able to suffer from other psychological health illnesses that are conducive to addiction.

The college phase is the most important and critical phase for young people to enter society. College students are hooked on playing online games, and there are many more activities hurting their examinations as well as their physical and mental health. Personal connections, especially in today's commercial and industrial society, interpersonal relationship is relatively distant, and social support is often difficult to meet, so it is easy to use mobile games as a substitute for social activities, as increasing precedence is providing that to gaming through other campaigns to the degree that gaming takes priority more than everyday activities and other interests and continuation or the escalation of gaming despite the disadvantageous results happening. As an abnormal kind of

addictive behavior, very few studies have specifically tested the link between mental health outcomes and MGAs because of a scarcity of notice tools for evaluating this abnormal kind of behavioral addiction. Exploring the relationship on this topic can, therefore, aid us in realizing how the tendency of MGAs may impede the self-efficacy of university students, and social development would provide mental health education to practice a number of disciplines, which is the motivation of this study.

2 | LITERATURE REVIEW

There have been hypotheses that suggest behavioral addictions are similar to substance abuse addictions (Sharma et al., 2021) and there are various instruments to assess these concepts, and there is a wide disparity in the adoption of diagnostic criteria. Substance-abusing individuals are unlikely to have addiction issues. Despite the adverse effects of substance abuse, their lives may not be profoundly affected by their use. As a result of continued substance abuse, addiction can have negative physical and psychological effects.

Recently, obsession with mobile phones has evolved into a disorder called smartphone addiction. Greenfield (2012) asserts that addiction involves two components: abuse or dependence on the substance or behavior and negative effects on one's life. It is generally determined whether one is addicted to such substances based on intensity and frequency of usage, the amount spent on it, and how it affects personal relationships. An implicit activity that describes a common trait would, in this way, limit the individual's freedom or dependence. In addition, when we talk about addiction, we are referring to compulsive behavior or behavior that is uncontrollable and distanced from an individual's normal behavior. The similarities between smartphone addiction mechanisms and conventional drug abuse make research in this area vital. The American Psychiatric Association has found links between smartphone addiction and neurotransmitters that could help us understand its possible addictive effects.

2.1 | MGA and related factors

Addictive behavior is special economic comportment that is a series of behavioral and psychological changes caused by consumers indulging in expanding their preferred products. Consumer addiction is not only manifested in the purchase of luxury goods, consumption of food, and so forth, and there has been a phenomenon of addiction to smartphones. “Internet addiction” was recognized by the dependence of the “network” as a pathology, an obsessive/compulsive disorder, which drives an individual to overuse this technology and consists of a wide variety of difficulties that lead to clear psychological and social damage due to the Internet's inordinate usage. There are interventions or no consistent diagnostic criteria for MGA, although it is one of the most pervasive public health issues among youths. Former researchers have pointed out that one handles their emotional pain by playing Internet games; however, the undue employment of Internet games for a retentive time perhaps divides one from actual involvement, therefore leading to serious psychological health troubles. According to a study by Mehmood et al. (2021), students with high anxiety and neuroticism tend to have high mobile phone addiction. MGA is a side effect of online game defects (Laconi et al., 2017). When researching the problem of MGA, the reason why researchers choose to learn from the research concept of Internet game addiction, on one hand, is that research not only precedes mobile phone addiction but also has gradually matured. As a manifestation of the terminalization of Internet addiction, research on mobile phone addiction did not become obvious until 2005. Our former research ascertained that the four characteristics of smartphone addiction, compulsion, operating damage, tolerance, and retreat, are still features of online addiction. The tie between MGA and Internet game addiction has not yet been clarified.

Previous research revealed that novel-era mobile games are further challenging, as multiusers of online role-play games have especially been the most prevalent, and players have selected to play challenging games in recent years (Raith et al., 2021). Most of the studies referred to two principal elements of addiction: fantasy and growth.

They play Internet games to prevent, neglect, or evade real-life anxiety and trouble (Sayeed et al., 2021). Another crux of stimulating is the need for growth which is an attempt to turn into stronger, progress, realize much, gain, and provoke fighting others (Wan & Chiou, 2006). However, MGA is more complicated than the concept of Internet game addiction. Although they have some similarities, the MGA shows more new features and problems. Over the years, negative outcomes due to MGA have been swiftly learned and have remained in scholars. Kim et al. (2022) illustrate that personality characteristics and gaming addiction differ based on the type of game played. Research has also indicated that people turn interactive with their family, friends, and communities and likewise become separated from their academic performance because of MGAs. Only a few studies have been directed regarding MGAs among young people, and there has been no discussion about this type of addiction among college students in Taiwan. Previous studies have further found that males are more likely to become addicted to mobile games due to their interactive, competitive, and collaborative natures (Laconi et al., 2017; Sayeed et al., 2021). Additionally, those who suffer from severe addiction to mobile gaming experience headaches, discomfort in their eyes, blurred vision, and ear discomfort. MGA has been discussed and regarded as a field of ordinary online addiction, including cybersex, gambling, online conversation, and game addiction. Depending on the common concept of addiction, MGA is featured through the substantial feasibility of demographic, social, and mental issues displaying themselves in troublesome portents such as missing the capability to dominate oneself in playing games, enduring retreat symptoms when avoiding playing games, and/or turning into the excessiveness of being hooked on games.

Aiming to fill this gap, the purpose of this research is to confirm the relationship between self-efficacy, academic performance, and MGA tendency among undergraduates in Taiwan. This article also finds its negative outcomes and MGA tendency to be the motivating factors among Taiwan's university students' viewpoints.

2.2 | Mobile self-efficacy and MGAs

The notion of self-efficacy that originated from Bandura's social cognitive viewpoint is cleared as “the belief that an individual can successfully implement the behavior required to yield the consequences.” This refers to one's subjective judgment and confidence in whether one has the ability to achieve a certain behavioral goal (Bandura, 1986). Self-efficacy implicates self-belief in affirming or preserving social connections. Therefore, individuals with grander self-efficacy are more likely to have and retain social relations smoothly, and fewer may undergo isolation. At present, Internet self-efficacy has become a new trend in research on the influencing factors of Internet addiction (Whitty & McLaughlin, 2007), which refers to the belief that a person has the capability to arrange and fulfill Internet activities to accomplish specified goals.

However, for a long time, researchers have focused on Internet usage self-efficacy, that is, individuals' confidence in their ability to use Internet functions. Some studies have found that there is a certain correlation between Internet usage time and Internet self-efficacy, but some researchers have found no significant correlation between the two (Yang et al., 2007). In addition, Jeong and Kim (2011) found a negative correlation between self-efficacy in the real world and game addiction, while a positive correlation was found with self-efficacy in the virtual world. Mobile devices have widened the availability of materials for education by raising flexibility and reducing costs. Looking at the current research, none of the studies has proposed relevant research on mobile self-efficacy. An additional study identified other psychological traits, such as aggression and narcissistic personality traits, as contributing factors to game addiction. Game addiction, however, is negatively associated with self-efficacy. Therefore, this study attempts to investigate the impact of college students' MGA tendencies on mobile self-efficacy and academic performance. Deliberating that loneliness is associated with strong habit-forming mobile phone usage, Internet social self-efficacy seems negatively related to offline social self-efficacy, and this opposing connection is especially evident among youngsters undergoing an addiction. Mobile game addicts are, as a result, anticipated to display a much higher level of smartphone usage than nonmobile self-efficacy. Mobile game addicts are, as a result, anticipated to display a much higher level of smartphone usage than nonmobile self-efficacy.

2.3 | Academic performance, mobile self-efficacy, and MGA tendency

The employment of the Internet, online social networks, and mobile phones is an integral part of numerous students' everyday lives for nonacademic campaigns and academic research, while it can impact lives with all direct features, including learning and academic performance, and yet they are able to be more exposed to the injurious effects and complications of mobile phone utilization (Mohammadi et al., 2018), which can even lead to physical distress, such as headaches, eye ache, blurry vision, and ear discomfort (Sayeed et al., 2021). By reducing the time and opportunities for gamers to practice real-life behaviors, potentially problematic mobile game use can also lead to psychological problems (von der Heiden et al., 2019). Our analysis by Othman et al. (2021) found a negative association between MGA and poor academic performance. Several researchers have discovered a negative association between academic performance and cellphone usage. In particular, a connection has been discovered between a decrease and smartphone multitasking in academic performance (Rosen et al., 2013). However, Samaha and Hawi (2016) realized that there was no relevance between their academic achievement and MGA among college students. Aiming to address scarcity, this study examines the correlation between MGAs and college performance in Taiwan.

An effectual mechanism for enhancing mobile self-efficacy, accomplishment, and motivation can cause students to obtain and exploit self-regulating study strategies (Hussain et al., 2021), as well as their belief that they will be successful in completing academic tasks. Therefore, enlightening students about reinforcing their belief that their academic performance can be enhanced and evolving their mobile self-efficacy may ensue in hard work and extra endeavor. Following Al-Jarrah et al. (2019), novel mobile technologies are disorderly instruments that are not helpful and raise disruption from studying. Considering such confrontation with information and communication technology employment, its adoption in higher education in the developing world particularly remains controversial, notwithstanding its utilization being an uninterrupted tendency. Students with low self-efficacy are more likely to avoid, postpone, or give up their tasks early (Hayat et al., 2020). Accordingly, academic success seems to be influenced largely by self-efficacy. In a study conducted by Alyami et al. (2017), academic self-efficacy positively impacted the academic performance of 214 university students. Therefore, it is significant for researchers to investigate these variables ahead of implementing a learning process involving mobile devices' employment for learning purposes. Consequently, it is significant for researchers to test these variables ahead of instigating a learning process involving mobile devices' employment for learning objects. Intentionally, this research measures students' academic performance and mobile self-efficacy toward smartphone adoption in Taiwan's colleges.

2.4 | Research purpose and hypotheses

Due to its possible negative impact on several forms of psychological disorders, the advent of new types of mobile games and addictive behavior has attracted the attention of researchers. Using the above framework, the following organizes the literature, beginning with the definition of the MGA concept and then showing outcomes (negative outcomes) and then antecedents (demographic characteristics of students). The proposed framework highlights that the current literature does not provide a clear causal relationship between mobile self-efficacy, academic performance, and MGA among Taiwanese undergraduate students. Following the above consideration, the following research hypotheses will be tested in the current study.

Hypothesis 1: *Students' demographics in cyberspace are negatively related to the level of MGA.*

Hypothesis 2: *Students' mobile self-efficacy in cyberspace is negatively related to the level of MGA.*

Hypothesis 3: *Students' academic performance in cyberspace is negatively associated with the degree of MGA.*

Hypothesis 4: *Students' perception of mobile self-efficacy is positively associated with academic performance.*

3 | METHODS

3.1 | Survey design

A total of 739 students from three colleges in Kaohsiung, Taiwan, were surveyed. In this prevailing pandemic context, it is not feasible to perform a vis-a-vis investigation, which is why the sample was gathered on the web via the designed Google form connection. Before taking part in this survey, the writer notified the respondents about the objective of this study and emphasized that the information they offered would be preserved as being voluntary and anonymous. The survey was carried out over a 3-month period from June 20, 2021 to September 25, 2021. A total of 780 responses were gathered, among which 41 responses were not completed or were invalid samples and were eliminated from the final sample set. The final data comprised 739 responses, and among them, 67.9% (n = 502) and 32.1% (n = 237) of the respondents were female and male, respectively. The participants' average age was 26.47 years (SD = 3.65), with a range of 20–35 years. The everyday time of adopting a smartphone was 4.02 ± 1.5 h, and the everyday time of presence in mobile gaming via smartphone was 4.94 ± 3.24 h. The duration of the players in mobile gaming was 2.4 ± 1.57 years.

3.2 | Measures

3.2.1 | Mobile game addiction

According to Sayeed et al. (2021) and Wang et al. (2019), a scale of MGA assessment was developed, and created a detailed 11-item scale. Every item was ranked on a Likert 5-point scale from 1 = strongly disagree to 5 = strongly agree, with absolute scores ranging from 11 to 55. A higher score showed a serious MGA tendency. Items include the following: (1) Playing mobile games is more open-hearted than hanging out with mates; (2) feeling more open-hearted in a virtual game world than in an outdoor game/social relation; (3) playing mobile games when feeling alone; (4) playing mobile games to deal with the new game/updated version; (5) playing mobile games for a long time to turn into an expert on the game; (6) I have felt dread when I can't play mobile games or played fewer than ordinary; (7) I have played mobile games so I would not be forced to think about disagreeable things; (8) even in class, I can't control the urge to play mobile games; (9) I don't get enough sleep because I stay up late to play mobile games, but I still like to play mobile games; (10) because of playing mobile games, my interaction with my family has decreased; and (11) playing mobile games has caused some negative effects on my learning (α = .83).

3.2.2 | Mobile self-efficacy

Students' mobile self-efficacy is an urgent contributor to their confidence in exhibiting a particular behavior when using a smartphone. According to Muris (2001) and Odede (2021), four items that measure mobile self-efficacy were developed, and the total scores ranged from 4 to 20. Items include: (1) I would be able to play mobile games for less than 2 h daily; (2) I would be able to decrease the time spent playing mobile games, although I enjoy playing games; (3) I would be able to decrease the time spent playing mobile games if I must hand in my schoolwork; and (4) I would be able to decrease the time spent playing mobile games if I must do something significant (α = .71).

3.2.3 | Academic performance

Academic performance represents the mentality of college undergraduates in terms of their reaction and academic achievement purposes. According to Bhattacherjee (2001), a four-item measure of academic performance was developed, and the total scores ranged from 4 to 20. Items include: (1) I have faith in my scholastic abilities; (2) I am successful in college; (3) I learn novel concepts quickly; and (4) I have faith in my ability to be successful in college ($\alpha = .86$).

4 | RESULTS

4.1 | Comparison between demographics and MGA

The present research consisted of 739 college students from Kaohsiung, Taiwan. MGA's incidence was 67% and 33% in female and male students, respectively. Participants lived with their parents/family 14.9% of the time, 54.1% in dormitories, and 31.0% in apartments alone. Additionally, our research showed that students living in dormitories played mobile games more than students living at home. A total of 28.2% of the respondents employed smartphones for social media, 20.1% for phone calls, 52.2% for the Internet, 1.8% for mail, 1.3% for short message services, 2.8% for playing games, 3.5% for creating videos/pictures, and 4.1% employed mobile phones for other intentions (Table 1). As a result of our study, we found that male students are not more likely to exhibit addictive behaviors than female students when it comes to MGA. Male students are approximately 1.3 times more likely to suffer from severe MGA than female students, according to Sayeed et al.'s (2021) study.

Table 1 indicates the comparison between the MGA and demographic variables. It is seen that the respondent's age is substantially connected with MGA ($\chi^2 = 13.861$, $p = .09$). Students' position of stay ($\chi^2 = 10.464$, $p = .025$) had an important positive effect on MGA, whereas gender and the purpose of using smartphones had no substantial correlation with game addiction tendencies. Furthermore, the period of playing a mobile game is considered a significant factor in MGA degrees. This research discovered that the play period from less than 1 h up to 5 h is substantially connected with the MGA. Thus, H_1 was partially supported.

4.2 | Correlation analysis

Table 2 indicates the zero-order correlations and descriptive outcomes among the research variables. MGA tendency was positively correlated with mobile self-efficacy and academic performance, with correlations ranging from −0.05 to −0.35. The outcomes placed substantial relationships between MGA and mobile self-efficacy. Mobile self-efficacy exhibited a negatively substantial connection with MGA ($r = -0.35$, $p < .001$), and MGA had a negatively substantial connection with academic performance ($r = -0.17$, $p < .01$), while mobile self-efficacy displayed no substantial relationship with academic performance.

4.3 | Structure model and hypothesis testing

Applying Amos 23.0, a structural equation analysis was conducted to test the connection between MGA, mobile self-efficacy, and academic performance. Our outcomes indicated that the data fit the model well, with $\chi^2/df = 2.163$ and root mean square error of approximation = 0.034 under the threshold of 0.05, showing a good model fit. Comparing our delimited model with the null model, the comparative fit index (0.94) is fitted by the normed fit index (0.92) likewise proposed as a good fit. The goodness of fit index (0.91) was lower than the suggested

TABLE 1 MGA tendency based on demographics

Demographic variable	Mobile game addiction *n* (%) = 142	Mobile game nonaddiction *n* (%) = 597	χ^2	*p* Value
Gender				
Female	48 (33.8%)	189 (31.7%)	2.354	.416
Male	94 (66.2%)	408 (68.3%)		
Age (years)				
<22	69 (48.6%)	254 (42.6%)	13.861	.009
22–25	41 (28.9%)	221 (37.0%)		
25+	32 (22.5%)	122 (20.4%)		
Place of stay				
With parents/family	12 (8.4%)	98 (16.4%)	10.464	.025
Alone in dormitory	64 (45.1%)	336 (56.3%)		
Alone in apartment	66 (46.5%)	163 (27.3%)		
Duration of playing mobile games				
<1 h	10 (7.04%)	201 (33.67%)	15.671	.000
1–2 h	29 (20.42%)	226 (37.86%)		
3–5 h	40 (28.17%)	110 (18.43%)		
>5 h	63 (44.37%)	60 (10.05%)		
Used smartphone for				
Social media	42 (29.6%)	166 (27.8%)	3.695	.162
Calls	31 (21.8%)	117 (19.6%)		
Internet	60 (42.2%)	326 (54.6%)		
E-mail	4 (2.8%)	9 (1.5%)		
Short message service	3 (2.1%)	6 (1.0%)		
Playing games	12 (8.5%)	8 (1.3%)		
Making videos/pictures	14 (9.9%)	11 (1.8%)		
For other purposes	10 (7.0%)	20 (3.4%)		

Abbreviation: MGA, mobile game addiction.

TABLE 2 Descriptive outcomes and correlations among the research variables

Variables (items)	Mean	SD	MGA	Mobile self-efficacy	Academic performance
MGA (11)	39.25	9.28	1.00		
Mobile self-efficacy (4)	11.94	5.73	−0.35***	1.00	
Academic performance (4)	12.09	4.82	−0.17**	−0.05	1.00

Abbreviation: MGA, mobile game addiction.

**$p < .01$; ***$p < .001$.

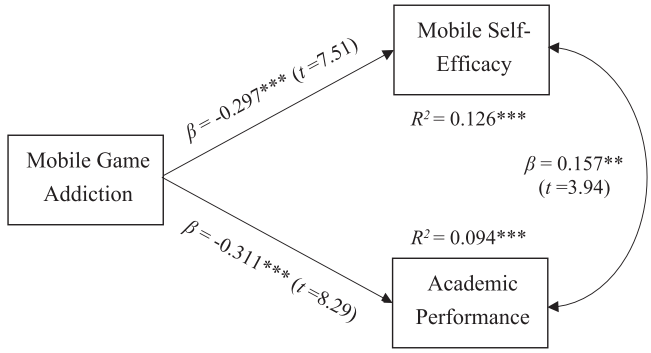


FIGURE 1 Results of the structural equation model. ***$p < .01$.

TABLE 3 Analysis of the relationship among MGA and depression, mobile self-efficacy, and academic performance

Proposed hypotheses	β	*t* Value	*p* Value	Significant
H_2: *Students' mobile self-efficacy in cyberspace is negatively related to the level of MGA (mobile self-efficacy → MGA).*	−.297***	7.51	<.01	Supported
H_3: *Students' academic performance in cyberspace is negatively associated with the degree of MGA (MGA → academic performance).*	−.311***	8.29	<.01	Supported
H_4: *Students' perception of mobile self-efficacy is positively associated with academic performance (mobile self-efficacy → academic performance).*	.157**	3.94	<.05	Supported

**$p < .05$.
***$p < .01$.

threshold, yet near enough that the model fits the data moderately. In summary, the total results show that this research structure suits the data with considerable reasonability (Hooper et al., 2008), so it was suitable to test the hypotheses within the structural model. Their significance and the approximated coefficients are illustrated in Table 2 concerning the structural model. The standardized β coefficients are depicted in Figure 1. MGA was negatively associated with mobile self-efficacy and academic performance, with $\beta = .297$, $p < .001$ and $\beta = .311$, $p < .001$, respectively. Mobile self-efficacy was negatively related to academic performance, with $\beta = .157$, $p < .005$ (Table 3).

5 | DISCUSSION AND CONCLUSION

This article's aim was to determine the prevalence of MGAs among university undergraduates in Taiwan. Efforts have been made to survey the associations between MGAs for this habit and ask about its contrary results. Our outcomes indicated that MGA had no significant association between gender and the purpose of utilizing smartphones; Mehmood et al. (2021) and Devís-Devís et al. (2009) reported similar discoveries. By comparison, some studies have reflected that male participants who exhibit MGAs have a higher prevalence than females (Sayeed et al., 2021). Moreover, additional studies are needed to unravel the inconsistent prevalence of MGA in females and males. Furthermore, the addiction degree rises as the period of playing mobile games rises. Strong proof that the play period is another important factor for evolving MGAs was offered by our outcome. They disclose more unusual addictions the more retentive time they spend playing. The consequences also disclose that students living in dormitories played mobile games more than their home-based counterparts. In light of former

studies on the topic, Moore and Schultz (1983) produced a close outcome. Students who live away from home and who are alone may use more mobile games to keep themselves busy and overcome loneliness (Abi-Jaoude et al., 2020). We ought to be more aware of how to be preserved from the loneliness curse. These associations entail that parents' interaction with their children could be valid in decreasing or guarding against MGA. We must assist our friends, classmates, and family members in overcoming loneliness, not just students. Students are more likely to become addicted to mobile games after being separated from their families, friends, and social interactions.

Our results indicate that college students with low mobile self-efficacy displayed and expanded the time spent playing mobile games on a daily basis. Consistent with a previous study, self-efficacy in the real environment exhibited a negative correlation with game addiction, which is comparable to our result. An Internet environment has a positive impact on students' mobile self-efficacy, according to Odede (2021). They are more resistant to game addiction, as mobile self-efficacy may be heightened or strengthened by virtual world encouragement. Nevertheless, college students show a much higher level of mobile self-efficacy in cyberspace, as they are more unrestrained in satisfying their demand for friendship in the online space. Playing mobile games can improve companionships among peers through social interplay. A mobile phone-based social network is a primary means for college students to socialize with peers. This characteristic may spread the time spent on mobile games. Relatedness is also more likely to stimulate college students who have promoted self-efficacy. In addition, mobile self-efficacy showed a direct negative influence on MGA, which means that students higher in mobile self-efficacy are more likely to manifest addictive gameplay when stimulated by relatedness.

One of this study's major aims was to define MGA disruptions on their academic performance and to influence their physical and psychological health to various degrees. With the increased degree of productivity provided through smartphones, one can deduce that students view smartphones as a means that can assist in boosting their academic performance. According to the findings, playing mobile games for a long time and causing physical and psychological discomfort significantly increases the risk of becoming addicted. MGA has the opposite effect on academic performance among undergraduate students in Taiwan based on this study, which is the first of its kind. According to and Mohammadi et al. (2018), who tested MGA among college students against academic performance in another study, our results are strongly supported. This study's outcomes provide adequate evidence to support that enthusiasm to play a mobile game is a causal element ahead of an addiction tendency.

6 | LIMITATIONS AND FUTURE DIRECTIONS

In addition to negatively affecting students' academic performance and their physical and psychological health, MGA also impairs their self-efficacy on mobile devices. The education division should provide undergraduates with scientific guidance on how to use smartphones and how to improve their psychological and physical health rationally. It should conduct students to prove that they have social adjustability for the cheerful and eloquent conclusion of their university learning and life journey. The consequence would have a number of significant implications for policymakers that have developed tools to avoid and/or meddle in MGA among college students.

The consequences of this study should be inspected considering its limitations. First, although this study offered interesting outcomes, it has no extensiveness since it is a cross-sectional design. Therefore, the direction of causality cannot be ascertained between the research variables. An experimental design should be adopted by successive investigations to set the causal relationship between the variables, or the prospective relationship should be inspected by a longitudinal design among the variables. The connection between psychological health problems and MGA might well be reciprocal, as prior studies have indicated. In addition, the sample is homogeneous and made up of students from regional universities, with the data collected via a Google form connection, keeping in mind the context of the pandemic in which the research was conducted. Our study would be more accurate if we included more Taiwanese universities in our sample. A future study needs to examine whether these results are generalizable to all college students. Third, the researcher may be able to acquire active gamers or mobile gamers as

a sample in the future to gain a deeper understanding of addictive behavior. Students in schools and colleges are advised to conduct research on MGA. Finally, the types of mobile games are not separated in this study, and distinct types of mobile games may embrace different playing times.

AUTHOR CONTRIBUTIONS

Kuo-Ming Chu designed the study, collected data, analyzed and interpreted data, wrote the report, and decided whether to submit the article for publication.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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