Modeling Self-Regulated Learning: The mediating role in the relationship between academic procrastination and problematic smartphone use among third year-middle school learning disabled students

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Abstract

Introduction. Inability to self-regulate learning is likely to be an indication of internet/mobile phone use. When students have low self-regulation, this may negatively predict problematic smartphone use. Additionally, problematic smartphone use could be a predictor of academic procrastination. The aim of this study was to investigate the mediating role of self-regulated learning in the relationship between academic procrastination and problematic smartphone use among third year-middle school learning disabled students.

Method. For the purpose of this study, quantitative survey research was employed. The independent variable is AP, PSU is the dependent variable and SRL is the moderating variable. 228 students from the four schools were selected. They were all in third year. They aged 14-15 years.

Results. Self-regulated learning correlates negatively with academic procrastination, and smartphone addiction. On the other hand, self-regulated learning was found to be positively correlated with Problematic Smartphone Use. This study found that academic procrastination predicted negatively self-regulated learning. SLR predicted AP.

Discussion and Conclusion. The results of this study raised our awareness of the mediating role of self-regulated learning in the relationship between academic procrastination and problematic smartphone use among third year-middle school learning disabled student.

Keywords. Self-Regulated Learning, Academic Procrastination, Problematic Smartphone Use, Third Year- Middle School Learning Disabled Students

Resumen

Introducción. Es probable que la incapacidad para autorregular el aprendizaje sea un indicador del uso de Internet / teléfonos móviles. Cuando los estudiantes tienen poca autorregulación, esto puede predecir negativamente el uso problemático de teléfonos inteligentes. Además, el uso problemático de teléfonos inteligentes podría predecir la procrastinación académica. El objetivo de este estudio fue investigar el papel mediador del aprendizaje autorregulado en la relación entre la procrastinación académica y el uso problemático de teléfonos inteligentes entre estudiantes con dificultad de aprendizaje de tercer año de secundaria.

Método. Para el propósito de este estudio, se empleó investigación cuantitativa de encuestas. La variable independiente es AP, PSU es la variable dependiente y SRL es la variable moderadora. Se seleccionaron 228 estudiantes de las cuatro escuelas. Todos estaban en tercer año. Tenían entre 14 y 15 años.

Resultados. El aprendizaje autorregulado se correlaciona negativamente con la procrastinación académica y la adicción a los teléfonos inteligentes. Por otro lado, se descubrió que el aprendizaje autorregulado se correlaciona positivamente con el uso problemático de teléfonos inteligentes. Este estudio encontró que la procrastinación académica predijo el aprendizaje autorregulado negativamente. SLR predijo AP.

Discusión y conclusión. Los resultados de este estudio aumentaron nuestra conciencia sobre el papel mediador del aprendizaje autorregulado en la relación entre la procrastinación académica y el uso problemático de teléfonos inteligentes entre los estudiantes con discapacidad de aprendizaje de tercer año de secundaria.

Palabras clave. Aprendizaje autorregulado, dilación académica, uso problemático de teléfonos inteligentes, tercer año: estudiantes con discapacidades de aprendizaje en la escuela secundaria

Introduction

Smartphone use has become part and parcel, that is an essential, basic element or an integral part of everyday life. Although smartphone applications are likely to be a source of convenience and entertainment for the users (students), they may have negative effects on their academics. There are many terms characterize the excessive use of smartphones, such as proneness to smartphone addiction, smartphone overuse, excessive smartphone use, problematic mobile phone use, mobile phone dependence, and mobile phone addiction (Dmitri, Kristiina & Karin, 2018).

This overuse is accompanied by symptoms that is likely to resemble those found in contemporary addiction models: dependence, withdrawal, tolerance, and functional impairment (Dmitri et al., 2018). Accordingly, this phenomenon may be conceptualized as problematic smartphone use (PSU).

Problematic smartphone use occurs when a person (a student here) spends too much time using or playing with his smartphone and this overuse imposes some negative effects on life (Shahrestanaki, et al., 2020), such as low academic performance, poor sleep quality, anxiety, depression, low self-esteem, decreased communication competence, less exercise, neck pain, wrist pain and blurred vision (Adil, Talal & Asma, 2020).

PSU is associated with negative outcomes such as low academic achievement and distraction from the learning process (Gugushvili et al., 2020). As shown by Ifeanyi & Chukwuere (2018), it distracted students from their studies in certain aspects. Smartphone addiction, or "Internet Gaming Disorder" can be a problematic behavior, according to DSM-5, but in order to be considered a formal addictive disorder, much research should be conducted (APA, 2013).

The influence of problematic smartphone use (PSU) on academic procrastination (AP)

Procrastination is considered to be a negative phenomenon that has remarkable impact students' academic performance. It can be described as a student's intention to carry out a certain academic task but has problems in getting motivated to do within the specified time (Adel, A sharaf, Mourad & Amaal, 2013; Fathi & Mourad, 2015). These delays lead to invaria-

bly inefficient or poor performance of students in their given task (Ferrari, O'Callaghan & Newbegin, 2005). High AP can lead to a dramatic decline in student learning performance (Wayan, Ketut & Wayan, 2020). In the domain of Internet use, students' high levels of Facebook use were found to be correlated with higher levels of academic procrastination (Sahin, 2014). In a study of Chinese university students (Yang, Asbury & Griffiths, 2018), it was revealed that PSU predicted academic procrastination. PSU mediated the relationships between self-regulation, and both academic anxiety and academic procrastination. Ayça, İlknur & Tuğba (2019) found that problematic smartphone use impacts academic procrastination. It was indicated that "problematic smartphone use" could be a predictor of academic procrastination (Ufuk, Mustafa, Süleyman & Kübra, 2013). It can be concluded that the influence of PSU on AP has been both theoretically and empirically supported.

The influence of Self-Regulated Learning (SRL) on PSU

SLR is correlated with adolescents' learning levels and academic results and performance (de la Fuente, 2017, 2019; de la Fuente et al., 2019; Fuentes et al., 2019; Martínez-Vicente & De la fuente, 2004; Zapata et al., 2016). There is a significant correlation between self-regulation and addiction among teenager (Kwan & Leung, 2017). The lower students' SRL is, the more they have smartphone addiction (Bogoan, Seok-won, Hwajung & Kyungsik, 2019). SRL predicted Problematic Smartphone Use (Zeyang, Kathryn & Mark, 2019). People's inability to self-regulate their learning might increase their smartphone usage (Penjira, Felicito, Ruangrit, & Penjuree, 2016). Inability to self-regulate learning is likely to be an indication of internet/mobile phone use (Soror, Steelman, & Limayem, 2012). When students have low self-regulation, this may negatively predict problematic smartphone use, as has been found in European samples (Gökçearslan, et al., 2016). The results of Lee, Cho, Kim & Noh's study (2015), in consistent with others' (e.g. Kim, Tak, & Lee, 2010; Sha, Looi, Chen, & Zhang, 2012) indicated that students who used smartphone less could have more SRL strategies and average learning flow, compared to those with those who are regarded as smartphone addicted.

Aims and Hypotheses

Based upon the aforementioned theoretical and empirical literature, there are some issues that should be resolved, especially in the context of learning disabilities. The mediating role of SLR in the relationship between PSU and AP should be investigated, as well as the inter-correlations between and among these variables. Four hypotheses are proposed: (i) PSU

will positively predict AP, (ii) SRL will positively predict AP, (iii) PSU will positively predict AP mediated via SRL, and (iv) SRL will negatively predict PSU. These hypotheses are presented as a hypothesized model in Figure 1.

Figure 1. *Model of hypotheses*

Method

Design

For the purpose of this study, quantitative survey research was employed. The independent variable is AP, PSU is the dependent variable and SRL is the moderating variable

Participants

Convenient sampling method was used to recruit the participants. The researcher selected six middle schools from Baltim City, Kafr El Sheikh, namely Martada Basic Education School, Al waheba middle School, El Aiash El Gharbi middle School and El Aiash El Sharki middle school, El Sabeia middle school, and El Baneieen middle school. The researcher confirmed that any information students would provide would be top secret and confidential. It would not be revealed to anyone. It would be used for research purpose only. Each student participant met the criteria for specific learning disorder. Those who demonstrated low achievement scores on a cognitive reading comprehension test (standardized test Mourad, 2015) (i.e., at least 1.5[SD] below their same age people (APA, 2013, P.70 ; Mourad, 2018, P.109), though their normal levels of intellectual functioning (Mourad, 2012; Mourad & Amaal, 2013; Hesham & Rasha, 2014;), the absence of any neurological or motor disorders (Al Said, 2014; Mohammed, 2014; Omema, 2015) were included. So 228 students from the four schools were selected. They were all in third year. They aged 14-15 years ($M=14.6$, $SD=1.12$).

Instruments

Brief Smartphone Addiction Scale (BSAS) (Csibi, Demetrovics & Szabo ,2016). The purpose of this scale was to assess exaggerated smartphone use. It is 6 items with a 6-point Likert scale from 1= strongly disagree, 6= strongly agree. The scale takes only 5 minutes to complete. Total scores typically range from 6 – 36. Principal components analysis yielded a single component for the 6-item tool, which accounted for 52.38% of the total variance. The internal reliability of the scale was good ($\alpha =0.82$). Content validity was achieved as there were significant differences between heavy and light users ($p <.001$) (Csibi et al. ,2016). The content validity of the scale was examined by a group of 10 experts. They assessed the relevance of each item using a four-point Likert scale (where 1 represents “irrelevant” and 4 represents “highly relevant”). They provided suggestions and comments. The 6 items were judged to be quite or highly relevant. A content validity index was calculated at the item level ($I-CVI = 0.90$). In this study, the internal reliability of the scale was good too ($\alpha =0.85$).

Self-Regulated Learning Scale. This scale was developed specifically for this study. It is a10 items with a 4-point Likert scale from 1 = Not very like me, 4 = very like me. The scale takes only 10 minutes to complete. Total scores typically range from 10 – 40. The internal reliability of the scale was good ($\alpha =0.89$). Content validity was achieved as there were significant differences between high and low self regulated students ($p <.001$). The content validity of the scale was examined by a group of 10 experts. They assessed the relevance of each item using a four-point Likert scale (where 1 represents “irrelevant” and 4 represents “highly relevant”). They provided suggestions and comments. The 10 items were judged to be quite or highly relevant. A content validity index was calculated at the item level ($I-CVI = 0.90$).

Procrastination Scale (Tuckman,1991). The purpose of this scale was to assess procrastination tendencies. It is a 16 items with a 4-point Likert (i.e. 1= that’s me for sure, 2 =that’s my tendency,3=that’s not my tendency,4= that’s not me for sure). Total scores typically range from 16 – 64. $\alpha = .86$. The content validity of the scale was examined by a group of 10 experts. They assessed the relevance of each item using a four-point Likert scale (where 1 represents “irrelevant” and 4 represents “highly relevant”). They provided suggestions and comments. The 16 items were judged to be quite or highly relevant. A content validity index was calculated at the item level ($I-CVI = 0.90$).

Procedures

Prior to administering the scales, the researcher informed students' parents with the help of social work teacher. They were given the option of accepting or refusing to allow their children's participation in the study. Students were also informed about purpose of the study. The researcher instructed them to honestly complete the scales. They were told to keep their identifies anonymous on the scale paper to ensure honesty and sincerity. They also were informed that they should participate voluntarily and nothing to be feared about even their responses. All data were entered in an SPSS file.

Data analysis

Pearson correlation and moderated hierarchical multiple regression analyses were conducted to test the hypotheses of the study.

Results

Descriptive data and inter-correlations

Table 1 shows the means, descriptive statistics, inter-correlations, and internal consistency coefficients of self-regulated learning, academic procrastination and Problematic Smartphone Use. Self-regulated learning correlates negatively with academic procrastination ($r = -0.53$), and smartphone addiction ($r = -0.49$). On the other hand, self-regulated learning was found to be positively correlated with Problematic Smartphone Use ($r = 0.41$).

Table 1. Descriptive statistics and inter-correlations of self-regulated learning, academic procrastination and Problematic Smartphone Use.

Variables	1	2	3
SRL	1.00		
AP	-.53**	1.00	
PSU	-.49**	.41**	1.00
Mean	29.57	32.19	47.65
Standard deviation	3.60	1.07	2.75

** $p < .01$

Note. SRL (self-regulated learning), AP (academic procrastination), PSU (Problematic Smartphone Use)

Testing the mediating role of SLR in the relationship between PSU and AP

From tables 2-4, it is clear that $R^2 = .677$, Adjusted $R^2 = .669$, which means that the independent variable, SLR, explains 66.9% of the variability of the dependent variable, PSU. The regression model is statistically significant, $F = 9.867$, $p = .002$. This indicates that, overall, the model applied can statistically significantly predict the dependent variable, PSU.

From tables 5-7, it is clear that $R^2 = .677$, Adjusted $R^2 = .669$, which means that the independent variable, SLR, explains 66.9% of the variability of the dependent variable, AP. The regression model is statistically significant, $F = 9.869$, $p = .002$. This indicates that, overall, the model applied can statistically significantly predict the dependent variable, AP.

Table 2. *The regression results of the relationship between SLR and PSU. Model Summary b*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change statistics					
					R Square change	F Change	Df1	Df2	Sig.	F change
1	0.478a	0.677	0.669	11.73011	0.677	9.867	1	118	0.002	

a. Predictor (constant), SLR

b. Dependent variable: PSU.

Table 3. *The regression results of the relationship between SLR and PSU (ANOVA)*

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	1357.703	1	1357.706	9.867	0.002a
Residual	16236.260	226	137.595		
Total	17593.967	227			

a. Predictor (constant), SLR

b. Dependent variable: PSU.

Table 4. *The regression results of the relationship between SLR and PSU. Coefficients a*

Model	Unstandardized coefficients		Standardized coefficients	t	sig	Correlations		
	B	Std error				Zero-order	Partial	part
1 (constant)	114.304	14.298		7.994	.000			
SLR	-.349	.111	-.279	-3.141	.002	-.278	-.278	-.278

b. Dependent variable: PSU.

Table 5. *The regression results of the relationship between SLR and AP Model Summary b*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change statistics				
					R Square change	F Change	Df1	Df2	Sig. F change
1	0.478a	0.677	0.669	8.71891	.677	9.869	1	118	.002

a. Predictor (constant): SLR

b. Dependent variable: AP

Table 6. *The regression results of the relationship between SLR and AP. ANOVA*

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	750.211	1	750.211	9.869	.002
Residual	8970.289	226	70.019		
Total	9720.500	227			

a. Predictor (constant): SLR

b. Dependent variable: AP

Table 7. *The regression results of the relationship between SLR and AP. Coefficients a*

Model	Unstandardized coefficients		Standardized coefficients	t	sig	Correlations		
	B	Std error	Beta			Zero-order	Partial	part
1 (constant)	91.542	10.628	-.278	8.614	.000	-.278	-.278	-.278
SLR	0.295	0.083		3.141	.002			

b. Dependent variable: AP

According to table 8, as for the effect of AP on SLR, the probability of getting a critical ratio as large as 3.155 in absolute value is 0.002. In other words, the regression weight for AP in the prediction of SLR is significantly different from zero at the 0.01 level (two-tailed). As to the effect of SLR on PSU, the probability of getting a critical ratio as large as 2.787 in absolute value is 0.005. In other words, the regression weight for SLR in the prediction of PSU is significantly different from zero at the 0.01 level (two-tailed). When the mediator (SLR) mediates between PSU and AP, the probability of getting a critical ratio as large as 0.915 in absolute value is 0.360. In other words, the regression weight for PSU in the prediction of AP is not significantly different from zero at the 0.05 level (two-tailed). This means that the relationship between independent variable (PSU) and dependent variable (AP) became insignificant. This also means that emotional intelligence is a mediator between PSU and AP, and this mediation is complete one.

Table 8. Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
SLR	<---	AP	-.298	.094	-3.155	.002	
PSU	<---	SLR	-.320	.115	-2.787	.005	
PSU	<---	AP	.112	.123	.915	.360	

Discussion

The present study aimed to investigate the mediating role of self-regulated learning in the relationship between academic procrastination and problematic smartphone use among third year-middle school learning disabled students.

Descriptive statistics, inter-correlations, and internal consistency coefficients of self-regulated learning, academic procrastination and smartphone addiction showed that self-regulated learning correlates negatively with academic and smartphone. On the other hand, self-regulated learning was found to be positively correlated with smartphone addiction. Although is inconsistent with the finding obtained by Penjira et al.(2016), which revealed that self-regulation had no significant effect on smartphone addiction, the findings of this study confirm previous other research that when students have higher levels of addiction, this is an indicator of having lower level of self-regulated learning, as well as low level of flow when studying (Lee et al., 2015).

This study found that academic procrastination predicted negatively self-regulated learning. In line with previous studies (Gökçearslan et al., 2016; LaRose & Eastin, 2004; LaRose et al., 2003; Soror et al., 2012; Van Deursen et al., 2015), SLR predicted AP. It seems that the students in the present study were more likely to procrastinate when they were not able to regulate their learning, hence, they could not or did not control their smartphone use. self-regulation may play a substantial role in smartphone addiction, as the dependence on smartphone is the result of uncontrolled and uncontrollable behavior (Kwan & Leung, 2017).

Application and implications

The results of this study raised our awareness of the mediating role of self-regulated learning in the relationship between academic procrastination and problematic smartphone use among third year-middle school learning disabled student .They also raised our awareness of the negative impact that problematic smartphone use has upon learning disabled students ,as those with low risk for problematic smartphone use could have higher average self-regulated learning, and vice versa. Additionally, students who have been highly prone to problematic smartphone use are rarely able to attain high academic achievement and may delay doing their assigned homework.

Conclusion

In conclusion, the aim of this study was to investigate the mediating role of self-regulated learning in the relationship between academic procrastination and problematic smartphone use among third year-middle school learning disabled students. It can be concluded that students who overuse smartphones procrastinate academic work, and they cannot be able to regulate their learning. Smartphone addiction prevent students from effective studying and time management (Serkan &Eken, 2018). The study findings expand our knowledge of the mediating role of self-regulated learning in the relationship between academic procrastination and problematic smartphone use among third year-middle school learning disabled students.

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