Academic Procrastination of University Students: The Role of Problematic Internet Use, Self-Regulated Online Learning, And Academic Self-Efficacy

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ABSTRACT

To understand the relationship between problematic internet use and academic procrastination, this study constructs a parallel mediation model to examine the impact of university students' problematic internet usage on their academic procrastination and the mediation effect of academic self-efficacy and self-regulated online learning. A total of 498 students in Turkey were surveyed using the Internet Addiction Scale-Short Version, the Academic Self-Efficacy Scale, the Academic Procrastination Scale, and the Self-Regulated Online Learning Scale. The correlation analysis demonstrated that problematic internet usage was positively correlated with academic procrastination. However, academic self-efficacy and self-regulated online learning were negatively correlated with academic procrastination and problematic internet usage. Further, the parallel mediation analysis showed that internet addiction has a direct predictive effect on students' academic procrastination and an indirect predictive effect via academic self-efficacy and self-regulated online learning. Specifically, academic self-efficacy and self-regulated online learning were found to be partial mediators and play a buffering role between problematic internet use and academic procrastination.

Keywords: *Human-computer interface, academic procrastination, problematic internet use, academic self-efficacy, distance education and online learning*

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INTRODUCTION

Pandemics have taken their toll throughout human history, with the most recent being COVID-19, which originated in China in 2020. With the pandemic, there have been numerous radical disruptive changes at the global level in almost all spheres of life, and education has been one of the most severely affected by these (Chaturvedi et al., 2021). In an effort not to interrupt their learning activities, schools have promptly switched to online education, and students have become exposed to environments in which they need to use online tools (Putri et al., 2020). The universities in Turkey have begun to provide their students with an online education experience as well, by using distance education management systems or outsourced

systems such as Zoom and Microsoft Teams, delivering all their theoretical courses synchronously and asynchronously, and administering all the tests online. During this period, faculty members have turned to homework and project-like assessment-evaluation tools and performed online assessments. Thus, undergraduate and graduate students in Turkey have been required to spend time in front of the screen at all stages of education. In addition to all these emergency measures, due to the curfews introduced later on, most social interactions have been limited to online social media platforms, and the time spent by young people on the screen has increased remarkably. Although the Internet offers many advantages, such as rapid access to a copious amount of information and tapping into multiple sources of knowledge (Chou & Tsai, 2002; Chuang & Tsai, 2005), problematic internet use among young people has been observed to increase rapidly. Studies report that the time they spend in front of the internet has increased significantly due to the effect of the pandemic, and therefore there has been a rise in the level of problematic internet use (Li et al., 2021; Sun et al., 2020).

Problematic internet use is the inability to control the desire to use the Internet for an increasing amount of time, the loss of meaning attached to the time spent without an Internet connection, the feeling of restlessness and aggression when trying to reduce the use of the Internet, the deterioration of the individual's life (work, family, and social), and the loss of control over the use of the Internet (Young, 2004; Young et al., 2011). In other words, it includes a psychological dependence on internet use (Kandell, 1998). Based on these definitions, it can be said that, as in other types of addiction, tolerance to the object of addiction increases in internet addiction, which makes the individual psychologically uneasy in its absence. Research highlights that behavioral addictions such as internet addiction mostly occur during the young adult years (Grant et al., 2010). Accordingly, approximately 15% of university students are vulnerable to excessive use of the internet and are in the most at-risk group (Young et al., 2011). The overall prevalence of problematic internet use during the pandemic among the general population has been reported to be 36.7% (Li et al., 2021), which is around 70% in the young population (18-25 years old) (Prakash et al., 2020). Increasing rates of problematic internet use have both psychological and environmental negative effects.

Addiction studies have found that problematic internet use provokes mental problems. Problematic internet use is closely linked to mental problems such as depression and stress as well (Dong et al., 2020; Singh et al., 2020). This type of addiction also results in negative effects on the academic career, and the research has identified an inverse correlation between problematic internet use and academic achievement (Akhter, 2013). In addition, students addicted to the internet postpone their academic work more often to spend more time online than those who are not (Nalwa & Anand, 2003). Analyses of the academic lives of the students studying online show that the internet offers them fun and enjoyable elements compared to the boring, difficult, and unpleasant school tasks. The internet, viewed as a distraction, is one of the most important factors that trigger students' academic procrastination (Davis et al., 2002). Other studies have determined that excessive and problematic internet use is an important variable in university students' tendency toward academic procrastination (Aznar-Díaz et al., 2020; Hayat et al., 2020). Accordingly, as the level of problematic internet use increases in university students, the tendency to postpone academic tasks also increases (Hayat et al., 2020). Considering that young adults are in the most vulnerable risk group for problematic internet use and that this development period coincides with university years, the need to understand the relationships between problematic internet use and academic procrastination becomes even more urgent.

Procrastination is the voluntary postponement or delay of an action that is considered important by the person, despite the potential negative consequences (Klingsieck, 2013; Steel, 2007). Approximately 20% of adults are known to be chronic procrastinators (Harriott & Ferrari, 1996). Although there are many forms of procrastination, academic procrastination is a behavioral type of procrastination that is more striking in terms of its effects on life.

Academic procrastination is the tendency of the student to delay or move his or her academic responsibilities to a future date (Solomon & Rothblum, 1984), the tendency to voluntarily postpone a work plan related to academic duties despite the inevitable negative consequences (Steel & Klingsieck, 2016), and intentionally and unnecessarily delaying the fulfillment of the responsibilities related to learning and study

(Zhao & Elder, 2020). It has been reported that approximately 52% (Özer et al., 2009), 70% (Schouwenburg, 2004), and 83% (Klassen & Kuzucu, 2009) of university students experience academic procrastination. Studies seem to agree that academic procrastination is a common type of behavioral procrastination among students (Peixoto et al., 2021; Rosário et al., 2009; Sirois & Pychyl, 2013; Zhao & Elder, 2020). Behavior patterns in this type of procrastination include behaviors such as delaying starting or finishing homework, failing to meet the deadline, avoiding academic tasks, writing term papers , delaying studying for exams to the last minute, and not completing daily and weekly review and reading assignments (Onwuegbuzie, 2004; Senécal et al., 2003; Steel, 2007). As such, it is likely that university students, the sample in which academic procrastination is most examined, will experience many problems as a result of postponing the actions they are responsible for. Studies report that academic procrastination prevents individuals from fulfilling their responsibilities, threatens productivity and well-being, causes poor academic performance, and has negative effects on mental health (Kim & Seo, 2015; Klingsieck, 2013; Onwuegbuzie, 2004; Peixoto et al., 2021; Steel 2007; Zhao & Elder, 2020).

The related research literature has generally focused on problematic internet use and general procrastination behaviors. Therefore, few studies have investigated the relationship between problematic internet use and academic procrastination (Geng et al., 2018; Li et al., 2020). However, previous studies assert that as the level of problematic internet use increases, the tendency of individuals to avoid fulfilling academic tasks will also increase.

H1: Problematic internet use predicts academic procrastination positively.

Studies on academic procrastination, which is characterized as deliberate and voluntary procrastination, focus on the causes of this behavior pattern. Studies frequently point to a failure of self-regulation among the factors that cause academic procrastination (Grunschel et al., 2018; Steel & Klingsieck, 2016; Klassen & Kuzucu, 2009; Sirois & Pychyl, 2013; Steel, 2007).

Self-regulation refers to the characteristics of individuals who can apply the strategies that the individual needs in their learning processes, re-evaluate and rearrange when necessary, and maintain the motivation necessary for their learning (Pintrich, 2000). Students with advanced self-regulation skills can balance the learning process and learning outcomes and control their learning strategies (Zimmerman, 1989). The concept of self-regulation in learning gains even more importance as the educational environment moves from school to home. Self-regulated learning emerges as a central concept for achieving academic success. Self-regulated learning is an active process that involves students being aware of the strengths and limitations of their learning processes and being able to conduct their learning in line with their own skills and make necessary adjustments (Zimmerman, 2002). Accordingly, students can evaluate their learning outcomes and make adjustments to the learning process when needed. However, if students lack self-regulation skills, they may delay the learning process by showing avoidance behavior instead of reviewing the deficiencies. The findings in the literature show a negative relationship between academic procrastination and self-regulated learning (Grunschel et al., 2018; Hejazi, 2021; Hong et al., 2021).

H2: Self-regulated learning predicts academic procrastination negatively.

In the literature, problematic internet use is described as a pathological condition (Brenner, 1997; Scherer, 1997; Young, 1998), a cognitive-behavioral problem (Brenner, 1997; Scherer, 1997; Young, 1998), and disruptions in self-regulation (LaRose, 2010; LaRose & Eastin, 2004; LaRose et al., 2003; Tokunaga, 2013). Based on these definitions, it can be said that there are intersections between problematic internet use and self-regulation skills. Studies show the mediating effect of self-regulation skills on the effects of problematic internet use on various variables (Zhang & Wu, 2020). Some studies have found a negative relationship between problematic internet use and self-regulation (Yu et al., 2019). During the pandemic, self-regulated learning skills in compulsory online education have drawn great research interest (Broadbent et al. 2020; Carter et al., 2020; Çebi & Güyer, 2020; Zhu et al., 2020), with a particular focus on the correlations between university students' changing internet usage habits and their self-regulated learning skills.

H3: Problematic internet use negatively predicts self-regulated online learning skills.

Academic procrastination studies indicate that an important variable among the reasons for procrastination is self-efficacy. Self-efficacy refers to the belief in an individual's capacity to successfully perform a certain task (Bandura, 1997). Academic self-efficacy, on the other hand, is defined as an individual's belief that he or she can successfully perform academic tasks (Yılmaz et al., 2007). Self-efficacy belief has the power to influence an individual's behavior because the stronger the perceived self-efficacy in fulfilling a performance, the higher the tendency to be successful in that performance. Accordingly, high self-efficacy enables one to make more effort when faced with a task or a challenge (Bandura, 1977; Zimmerman, 2000). Therefore, a strong self-efficacy belief in the individual will encourage the individual to strive to initiate, maintain, and complete the task instead of avoiding, delaying, or procrastinating. The related research shows that self-efficacy beliefs are associated with procrastination behaviors. In their study with university students, Ferrari, Parker, and Ware (1992) found that low self-efficacy perception increases academic procrastination. Other studies report similar findings (Klassen & Kuzucu, 2009; Waschle et al., 2014).

H4: Academic self-efficacy predicts academic procrastination negatively.

Several studies have found that Internet addicts have low self-efficacy perceptions (Akin & İskender, 2011; Berte et al., 2021). A negative, significant relationship has been identified between university students' perceptions of academic self-efficacy and internet addiction levels, and problematic internet use has been found to explain academic self-efficacy (Alrekebat, 2016; Baturay & Toker, 2019; Li et al., 2020).

H5: Problematic internet use negatively predicts academic self-efficacy.

Based on the literature findings, the sixth hypothesis below was included in the study.

H6: Academic self-efficacy and self-regulated learning mediate the relationship between problematic internet use and academic procrastination.

The increase in time spent on the Internet by undergraduate and graduate students during the pandemic appears to have led to an increase in their behavior of postponing academic tasks. Although some studies have examined the relationship between problematic internet use and procrastination in university students (Aznar-Díaz et al., 2020; Hayat et al., 2020), no study has so far examined the mediating variables in this relationship. The studies mentioned so far indicate that the mediating variables may be self-efficacy and regulated learning. Determining the mediating variables between academic procrastination and problematic internet use is expected to contribute to a better understanding of procrastination behavior and the development of possible intervention programs in this context. In addition, the findings to be obtained from this study are thought to be important in terms of serving as a guide to preventive and protective studies in mental health. In addition, it is expected to form the basis for future research by presenting new findings in the academic procrastination literature. In the current study, the relationship between problematic internet use and academic procrastination was examined through academic self-efficacy and self-regulated online learning skills to reveal the effect of problematic internet use on academic environments.

RESEARCH METHOD

Research Model

The current research was designed as a quantitative cross-sectional study to understand the factors that affect academic procrastination

Participants

This study was conducted with undergraduate and graduate students studying via distance education in 2020-2021. The sample size was calculated according to the criteria in Krejcie & Morgan (1970). With the convenient sampling method, 2621 students studying at various universities in Turkey were reached, and 498 of them completed the study. The demographic characteristics of the participants are given in the table below.

Table 1. *Frequencies and Percentage of Demographic Variables*

Variables		n	%
Gender	Female	347	69.7
	Male	151	30.3
Class	Freshman (1st year)	99	19.9
	Sophomore (2nd year)	140	28.1
	Junior (3rd year)	137	27.5
	Senior (4th year)	75	15.1
	5th year	6	1.2
	Master's Degree	25	5.0
	Doctorate	10	2.0
	Other	6	1.2
Technological tools used while studying	Desktop	93	18.7
	Laptop	367	73.7
	Tablet	43	8.6
	Smartphone	344	69.1
	Other	11	2.2

Of the participants, 347 (69.2%) are female and 151 (30.3%) are male. When the participants' years of study are examined, it is seen that 99 (19.9%) are in the 1st year, 140 (28.1%) in the 2nd year, 137 (27.5%) in the 3rd year, 75 (15.1%) in the 4th year, and 6 (1.2%) are in their 5th year of study. In addition, 25 (5.0%) master's and 10 Ph.D. (2.0%) students contributed to the study. 367 (73.7%) of them use their laptops, and 344 (69.1%) use their smartphones to do their academic work. While 93 (18.7%) of the participants use a PC in their studies, only 43 (8.6%) of them study with the help of a tablet computer.

Data Collection Tool

The data were collected with the help of an online data collection platform. The measurement tool used in the study consists of five sections.

Demographic information. In this section, the participants were asked about their gender, year of study, and the technological devices they preferred while studying.

Aitken Academic Procrastination Scale. The academic procrastination scale was developed by Aitken (1982) to measure the tendency to procrastinate on academic tasks (see supplementary materials). The scale, consisting of 19 items and one dimension, was designed as a 5-point Likert type (1: False, 2: Mostly false, 3: sometimes true, sometimes false, 4: Mostly true, 5: True). High scores on this scale indicate that participants tend to procrastinate. The academic procrastination scale was adapted into Turkish by Balkıs (2006). The reliability of the results obtained from this study was found to be Cronbach alpha =.900 McDonald omega =.902. According to Nunnally and Bernstein (1994), it is acceptable to use alpha and omega values greater than .70.

Academic Self-Efficacy Scale. Jerusalem and Schwarzer (1981) designed the Academic Self-Efficacy Scale to measure students' perceptions of self-efficacy in their academic work (see supplementary materials). This scale was adapted into Turkish by Yılmaz, Gürçay, and Ekici (2007). It consists of 7 items and one dimension. The seventh item contains a negative statement. This scale, prepared in a 4-point Likert type, is scaled as 1 'Doesn't describe me at all', 2 'It describes me very little', 3 'Describes me' and 4 as 'Completely describes me'. High scores indicate that participants have high self-efficacy in academic affairs. The reliability coefficients of the academic self-efficacy scale were determined as Cronbach alpha .796 and McDonald's omega .813.

Young's Internet Addiction Test-Short Form. This Internet addiction test was developed by Young (1998) and converted into a short form with 12 items by Pawlikowski, Altstötter-Gleich, and Brand (2013) (see supplementary materials). The short form was adapted into Turkish by Kutlu, Savcı, Demir, and Aysan (2016). The scale consists of one dimension and is designed as a 5-point Likert type (1: Never, 2: Rarely, 3: Sometimes, 4: Often, 5: Always). High scores indicate that participants have a high level of problematic internet use. For the current study, the reliability coefficients of Young's Internet Addiction Test were calculated as Cronbach alpha .866 and McDonald's omega .866.

Self-Regulated Online Learning Questionnaire (SOL-Q). Self-regulated online learning questionnaire (SOL-Q) was developed to reveal students' self-regulated learning skills in online environments (Jansen et al., 2017), and it was adapted into Turkish by Yavuzalp and Özdemir (2020). The scale, consisting of 36 items, was designed in a 7-point Likert type (see supplementary materials). Items 19 and 21 contain negative statements. The sub-dimensions of the scale are metacognitive skills, environmental structuring, time management, help-seeking, and persistence. High scores obtained from the total of the scale mean that participants have high self-regulation skills in educational activities on the Internet. In the current study, the reliability coefficient was calculated as alpha .965 for the metacognitive skills sub-dimension,.916 for the environmental structuring sub-dimension, .50 for the time management sub- dimension, .900 for the persistence sub-dimension, and .861 for the help-seeking sub- dimension. The Cronbach alpha coefficient calculated for the entire scale is .964 and the omega coefficient is .966.

Procedure

Universities in Turkey offered distance education in the fall and spring semesters of 2020- 2021. Undergraduate and graduate students who were officially enrolled as students during this period were contacted online and asked to fill out the scales on questionpro.com. Before the scales were distributed to the participants, a pilot study was conducted with five university students, and feedback was received on the intelligibility of the data collection tools.

The study met all necessary ethical standards and received approval from an ethics committee at a university. This study was carried out in accordance with the recommendations of the ethics committee of Eskişehir Osmangazi University (Document Number 2021-05). Each participant was first asked to approve the research participation consent form. Participants have the right to quit at any stage of the research, and no information was received to reveal their identities.

Data Analysis

Descriptive statistics, multiple regression analysis, and bootstrap parallel (multiple) mediation analysis were used for the data analysis. The analyses were carried out with the help of the Jamovi 1.8.4 program. It was determined that the assumptions of the multiple regression analysis were met, and the obtained values were reported in the findings section.

5000 sample method and 95% confidence interval were preferred for the Bootstrap multi-mediation analysis. The fact that the confidence intervals of the parameters of indirect effects do not include zero indicates significant mediation (Preacher et al., 2007).

FINDINGS

Descriptive Statistics and Correlation Analysis

To achieve the aim of the study, descriptive statistics and correlational analysis were applied. The descriptive statistics and correlation coefficients of the variables are summarized in Table 2 below.

Table 2. *Descriptive Statistics and Correlation Coefficients of Academic Procrastination, Academic Self-Efficacy, Problematic Internet Use, and Self-Regulated Online Learning Skills Variables*

Variables	1	2	3	4
1.Academic Procrastination	-			
2. Self Regulated Learning Skills	-0.51**	-		
3. Problematic Internet Use	0.46**	-0.31**	-	
4. Academic Self-efficacy	-0.38**	0.39**	-0.24**	-
Mean	34.9	155	27.1	20.4
sd	10.8	42.6	8.19	3.59
Minimum	16	42	12	9
Maximum	66	252	52	28
Skewness	0.32	-0.28	0.44	-0.10
Kurtosis	-0.50	-0.25	-0.19	-0.18

Note. n = 498, ** < .01

The academic procrastination tendencies of undergraduate and graduate students were found to be moderate (M= 34.9, sd= 10.8). As indicated by the skewness and kurtosis values in Table 2, the variables showed a normal distribution.

Scores below 30 on Young's Internet Addiction Test-short form indicate that the person does not have problematic internet use. On the other hand, scores between 30 and 37 mean that the participant has moderately problematic internet use, and scores of 37 and above mean that s/he has a pathological level of problematic internet use (Meerkerk, 2007; Pawlikowski et al., 2013). When the frequencies and percentages of the total scores obtained on the short form were calculated according to the cut-off points, it was determined that 12.4% (n=62) of the participants had pathological addiction and 19.9% (n=99) had a moderate level of addiction.

As seen in Table 3, academic self-efficacy and self-regulated online learning skills are negatively and moderately correlated with academic procrastination (r= -0.38, r: -0.51, p <0.01). As academic self-efficacy and self-regulated online learning skills of university students increase, academic procrastination behaviors decrease. On the other hand, problematic internet use shows a positive moderate linear relationship with academic procrastination (r=0.46, p< 0.01). To put it more clearly, as problematic internet use increases in university students, academic procrastination tendencies also increase. Finally, a negative and low-level significant relationship was found between problematic internet use, academic self-efficacy, and self-regulated online learning skills (r=-0.24, r=-0.31, p< 0.01). The effect size is small if the value of r fluctuates around 0.1, medium if r varies around 0.3, and big if r varies more than 0.5 (Cohen, 1992).

Multiple Regression Analysis

Durbin-Watson (DW) test was applied to detect autocorrelation from multiple linear regression analysis assumptions. The DW statistical value was found to be 1.73, and values greater than 1.5 and less than 3 were considered acceptable (Field, 2013; Kalaycı, 2010). The VIF values were calculated to determine whether there was a multicollinearity problem or not. VIF values less than 10 indicate no multicollinearity (Büyüköztürk, 2015; Field, 2013). In light of all these results, the values calculated for the assumption control were found to be within acceptable limits (VIF self-regulated learning: 1.23, VIF problematic internet use: 1.13, VIF academic self-efficacy: 1.18).

Multiple regression analysis was applied to determine the independent variables that predicted the dependent variable of academic procrastination and the findings of the regression model are reported in Table 3.

Table 3. *Multiple Regression Analysis Results*

Variables	B	SE B	β	*t*	*p*
Constant	48.23	3.06		15.78	<.001**
Self-regulated learning skills	-0.09	0.01	-0.35	-8.98	<.001**
Problematic internet use	0.41	0.05	0.31	8.34	<.001**
Academic Self-efficacy	-0.53	0.11	-0.18	-4.59	<.001**

Note. R=0.62, R^2=0.39, adjusted R^2= 0.38, $F_{(494,3)}$=105, $p < .05$

Academic procrastination tendencies were found to be significantly predicted by self-regulated online learning skills, problematic internet use, and academic self-efficacy(F(494,3)=105, p < .05). Based on this, self-regulated online learning skills, problematic internet use, and academic self-efficacy explain 39% of the variance in academic procrastination tendencies. Considering the standard coefficients (beta) of the independent variables, the most important variable predicting academic procrastination was determined to be self-regulated online learning skills (Beta= -0.35), which is followed by problematic internet use (beta: 0.31) and academic self-efficacy (beta = -0.18), respectively.

Parallel (Multiple) Mediation Analysis

In the study, a model was tested in which academic procrastination was the dependent variable (Y), problematic internet use was the independent variable (X), and academic self-efficacy and self-regulated online learning were the mediating variables (M1 and M2) (Figure 1).

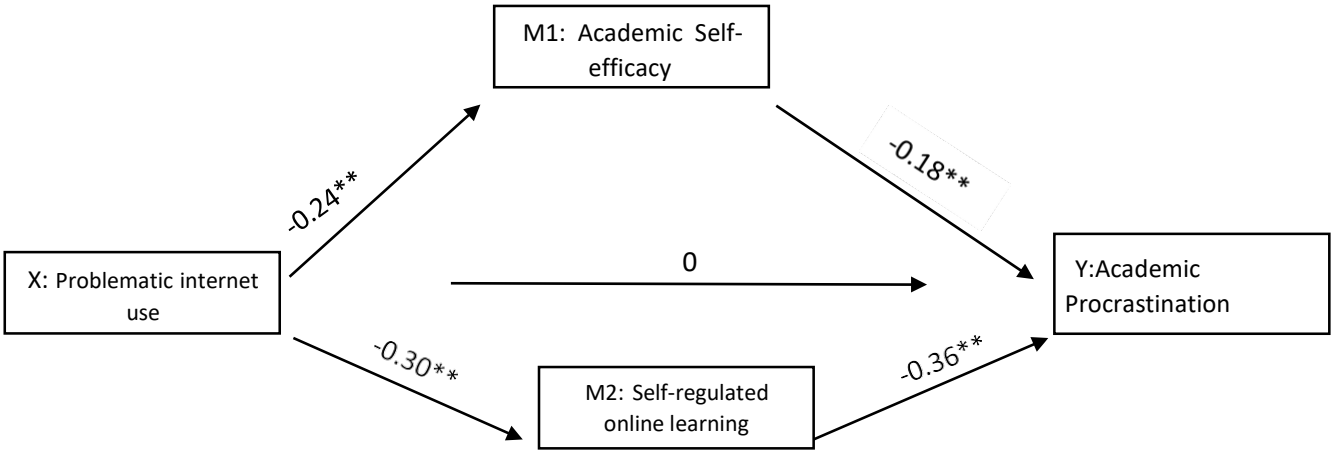

Fig. 1. Mediation Model

Table 4. *Direct, Indirect, and Total Effects/Multi-Mediation Effect Results in Academic Self-Efficacy And Self-Regulated Online Learning Skills in The Relationship Between Problematic Internet Use and Academic Procrastination*

				95% CI				
	Paths of influence	**Estimate**	**Standart Error**	**Lower**	**Upper**	**β**	**z**	***p***
Indirect	X->M1->Y	0.06	0.02	0.02	0.09	0.04	3.40	<0.001
	X-> M2->Y	0.14	0.03	0.09	0.19	0.11	5.32	<0.001
Component	X->M1	-0.11	0.02	-0.15	-0.07	-0.24	-5.51	<0.001
	M1->Y	-0.53	0.12	-0.77	-0.28	-0.18	-4.25	<0.001
	X-> M2	-1.58	0.23	-2.03	-1.13	-0.30	-6.83	<0.001
	M2-> Y	-0.09	0.01	-0.11	-0.07	-0.36	-8.03	<0.001
Direct	X-> Y	0.41	0.05	0.31	0.51	0.32	8.20	<0.001
Total	X-> Y	0.61	0.05	0.50	0.71	0.46	11.58	<0.001

The total effect of the problematic internet use variable on academic procrastination was statistically significant (β: 0.46, p < .001). According to Table 4, problematic internet use affects academic procrastination through academic self-efficacy and self-regulated online learning skills. When the 95% bias-corrected confidence intervals of 5000 bootstrap samples are examined, the indirect effect coefficients on academic self-efficacy do not include zero (95% C.I. : 0.02, 0.09). Similarly, confidence intervals of indirect effect coefficients on self-regulated online learning skills do not include zero (95% C.I. : 0.09, 0.19). This shows that academic self-efficacy and self-regulated online learning skills have a partial mediating effect on the relationship between problematic internet use and academic procrastination. Looking at Table 4, the participants with high problematic internet use were found to have lower academic self-efficacy (β: -0.24) and self-regulated online learning skills (β: -0.30). At the same time, the participants with high problematic internet use stated that they had lower academic self-efficacy, while those with low academic self-efficacy were found to have higher academic procrastination (β: -0.18). Similarly, as the participants' problematic internet use increased, their self-regulated online learning skills decreased, affecting the increase in academic procrastination behaviors (β: - 0.36).

Consequently, academic self-efficacy and self-regulated online learning skills have a partial mediation effect on the effect of problematic internet use on academic procrastination among undergraduate and graduate students who have experienced compulsory (emergency) online education.

DISCUSSION AND CONCLUSION

The present study attempted to determine the variables that predict the academic procrastination tendencies of undergraduate and graduate students. Based on the results of multiple regression analysis; in order of importance, self-regulated online learning skills, problematic internet use, and academic self-

efficacy significantly predict academic procrastination and explain 39% of the variance in academic procrastination As a result, as university students' self-regulated learning and academic self-efficacy decline, academic procrastination tendencies rise. In addition, as students' problematic internet use increases, their academic procrastination tendencies also increase. Furthermore, the academic self-efficacy and self-regulated learning variables were found to be partial mediators in the relationship between academic procrastination and problematic internet use. Thus, it can be said that all the hypotheses (H1, H2, H3, H4, H5, and H6) in the study were confirmed.

In this study, it was found that academic procrastination was most associated with self-regulated learning skills. In other words, as the self-regulated online learning skills of undergraduate and graduate students decrease, academic procrastination tendencies increase. The related studies frequently highlight the failure of self-regulation among the factors that lead to academic procrastination (Grunschel et al., 2018; Steel & Klingsieck, 2016; Steel, 2007). Studies conducted on different student groups have found a negative relationship between academic procrastination and self-regulated online learning (Grunschel et al., 2018; Hejazi, 2021; Klassen et al., 2008). Accordingly, it can be said that the present finding is consistent with the findings of the literature and is in the expected direction. It stands to reason that students' lack of ability to evaluate their own learning processes realistically, develop appropriate strategies according to their needs, and apply and organize these strategies leads them to postpone academic tasks by showing avoidance behavior instead of reviewing the deficiencies in the learning process.

The Internet, seen as a distraction, is one of the most important factors that trigger students' academic procrastination (Davis et al., 2002). Examining the relationships between the variables, a positive relationship was found between problematic internet use and academic procrastination. This means that students with high problematic internet use during the compulsory online education process have a high tendency to procrastinate. The studies conducted with undergraduate students have reported that the tendency to postpone academic tasks increases along with the level of problematic internet use (Aznar-Díaz et al., 2020; Hayat et al., 2020). Accordingly, it can be said that the current finding is consistent with the findings of previous studies (Custer, 2016; Demir & Kutlu, 2018; Kandemir, 2014; Kindt et al., 2019; Tras & Gökçen, 2020; Wretschko, 2006). According to Musetti and Corsano (2018), the Internet is taking over people's lives and occupying all their time in daily life. This preoccupation pushes individuals' education, career, or family responsibilities to the back burner, lowering their priority. Accordingly, it can be said that the Internet, which has become the priority of individuals, maybe an important risk factor for students to postpone their academic duties and responsibilities. These findings reveal that university students exposed to compulsory online education exhibit procrastination behaviors in fulfilling their academic duties as the importance and priority they give to the Internet increases. In addition, this finding expands those of other studies in terms of revealing the possible damage of the COVID-19 pandemic to education and mental health in terms of conducting online education with undergraduate and graduate students.

The findings further indicate that the academic self-efficacy variable, which explains academic procrastination in the third place, is negatively related, which shows that as academic self-efficacy decreases, academic procrastination tends to increase. This result shows that individuals who are not self-confident in fulfilling their academic duties tend to procrastinate more in fulfilling their academic responsibilities. Studies conducted with various student groups have reported that academic procrastination tends to increase as academic self-efficacy decreases (Ferrari et al., 1992; Haycock et al., 1998; Kandemir, 2014; Klassen et al., 2008; Klassen & Kuzucu, 2009; Li et al., 2020; Waschle et al., 2014). Thus, the findings in the current study are supported by the related literature. According to Klassen et al. (2008), academic procrastination may result not only from a lack of knowledge and skills but also from a lack of faith in fulfilling academic tasks. Accordingly, self-efficacy belief has the power to direct the behavior of the individual. Therefore, individuals

with high self-efficacy make a stronger effort to fulfill a task (Bandura, 1977; Zimmerman, 2000). As a result, the individual with a strong self-efficacy belief will encourage others to complete the task instead of avoiding, delaying, or procrastinating. Based on this finding, it can be argued that individuals who think that they do not have the competence they should have in their academic life do not tackle the challenges involved in their academic tasks and prefer to postpone them.

The results also show that problematic internet use negatively predicts self-regulated learning skills, thus causing an increase in academic procrastination. Multiple mediation analysis findings reveal that self-regulated learning skills are an important mediator variable in the relationship between problematic internet use and academic procrastination. This supports other studies that show a significant relationship between problematic internet use and academic procrastination in a sample of undergraduate students (Geng et al., 2018; Yang et al., 2019). Considering that problematic internet use is characterized by the inability to prevent the desire to use the Internet for an increasing amount of time, the time spent without internet access losing its meaning, and the inability to control internet use (Young et al., 2011), this tendency prevents students from putting their learning experiences into practice (Yu et al., 2019). Therefore, the individual who lacks self-regulation skills postpones academic tasks by showing avoidance or delaying behavior instead of reviewing the deficiencies in the learning process (Grunschel et al., 2018; Hejazi, 2021; Hong et al., 2021). Kubey et al. (2001) stated in their study that the academic performance of students with problematic internet use is four times lower than that of those without problematic internet use. Accordingly, the finding regarding the existing mediator variable seems reasonable. Students' problematic internet use increases their academic procrastination tendencies by decreasing their self-regulated learning skills. From another perspective, undergraduate and graduate students with problematic internet use have difficulties maintaining and reorganizing their self-regulated learning skills, and as a result, academic procrastination tendencies increase.

Finally, this study found out that academic self-efficacy plays a partial mediator role between problematic internet use and academic procrastination, which shows that university students who are more dependent on the Internet feel low academic competence, and as a result, they tend to postpone their academic tasks. Studies in the literature have reported that students with high problematic internet use have less proficiency in their academic life (Li et al., 2020; Odaci, 2011). When individuals have difficulties in their academic duties, they tend to engage in more enjoyable activities (Davis et al., 2002). Accordingly, considering the fact that internet-addicted individuals cannot prevent their desire to use the internet for increased periods (Young, 2004), this orientation lowers the students' belief that they can fulfill their academic responsibilities successfully (Alrekebat, 2016; Baturay & Toker, 2019; Li et al., 2020). Therefore, low self- efficacy belief in the individual increases the tendency to avoid, delay, or postpone the task (Ferrari et al., 1992; Klassen & Kuzucu, 2009; Waschle et al., 2014). Thus, problematic internet usage increases their academic procrastination tendencies by decreasing their self-efficacy beliefs. Undergraduate and graduate students with problematic internet use decrease their self-efficacy beliefs and feel inadequate, and as a result, their academic procrastination tendencies get stronger. In this sense, students who value the Internet more than anything else in their daily lives may act more carelessly while fulfilling their academic duties and prefer to have a pleasant time on the Internet instead of working on critical tasks like preparing for an exam.

When the findings obtained from the research are considered in general, it can be said that problematic internet use reduces the level of self-regulation and self-efficacy. Thus, there is a tendency to postpone academic tasks as the belief that they can organize their learning experiences and complete a task successfully decreases.

Suggestions

Some recommendations can be made based on the findings of this study. It is clear that eliminating the Internet from daily life is impossible. However, students who are clinically dependent on the Internet can be identified and helped with intervention programs. Psychoeducation can be used to help online students improve their self-regulated learning skills (e.g., time management, landscaping, planning, and monitoring). In addition, various experimental activities can be conducted to protect learners who spend too much time in front of the screen from the distracting elements of the internet. By applying the mental image or mindfulness method, students can be helped to connect with their future selves and the present moment, and by increasing their self-regulation and self-efficacy, they can be helped to stop procrastinating their academic tasks. Finally, students can gain self-regulated learning skills by carrying out preventive mental health activities.

Limitations

Despite revealing many important findings on academic procrastination behaviors, this study has some limitations. Designed cross-sectionally, this study was aimed at drawing attention to student behaviors during a certain period. The structural equation modeling (SEM) technique can be used to reveal cause-and-effect relationships. In particular, some other moderator variables that may affect the relationship between problematic internet use and academic procrastination can be added to the model. In addition, studies that require an in-depth examination of the relationships between problematic internet use and academic procrastination are needed. The findings of this study can be supported by qualitative data. The most accurate model showing the relationship between problematic internet use and academic procrastination can be created using grounded theory, one of the qualitative research methods. The fact that the data in the study are self-reported can also be viewed as a limitation. Due to the social desirability effect, the participants may have given more moderate answers than they normally would. Therefore, the findings can be further supported with data based on observations and interviews.

Conclusion

During the pandemic, educators in Turkey have faced academic procrastination and problematic internet use among their undergraduate and graduate students, posing a serious problem. The results of this study reveal the factors underlying the academic procrastination behaviors of university students in the online learning/teaching processes. In particular, students with high levels of problematic internet use were found to have low academic self-efficacy and self-regulated learning skills, leading to their failure at academic tasks.

Statements on potential conflicts of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

This study was carried out in accordance with the recommendations of the ethics committee of Eskişehir Osmangazi University (Document Number 2021-05). Besides, all participants signed an informed consent form prior to their participation in the study.

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