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Research Article

The Relationships among Academic Procrastination, Self-Control, and Problematic Mobile Use: Considering the Differences over Personalities

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Abstract

Only a few studies in the literature have dwelt on the relationships among problematic mobile phone use, academic procrastination, and self-control based on personality traits and how these three affect one another. In this sense, the purpose of this study is to reveal how the relationships among the variables of problematic mobile use, self-control, and academic procrastination change based on the Big Five personality traits. Data have been collected from 571 university students. The Academic Procrastination Scale, Problematic Mobile Phone Use Scale, Self-Control Scale, and Adjective-Based Personality Test have been used as data collection tools. Path analysis is used for analyzing the data. Firstly, descriptive statistics for the mean, standard deviation, skewness, and kurtosis values have been calculated for each variable in the model. Secondly, the data set of the study is examined in terms of multivariate normality. Thirdly, the path model is estimated using the IBM Statistical Packages for the Analysis of Moment Structures. As a result of the data analysis, the negative effect of experiential self-control on problematic mobile use has been seen to be significantly higher in the more neurotic. Also, the negative effect of experiential self-control on academic procrastination has been found to be significantly higher in the less extraverted and less agreeable individuals. The negative effect of reformative self-control on academic procrastination has been determined to be statistically higher for those with lower conscientiousness and openness. The significant positive effect of redressive self-control on academic procrastination has been identified to be higher in the less neurotic and the less conscientious individuals. This study is believed to contribute to the field as it offers measures on taking self-control into account in order to prevent problematic mobile phone use and academic procrastination in people with various personality traits.

Keywords

Academic procrastination • Problematic mobile phone use • Personality trait • Path analysis • Self-control

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Today, mobile phones are an indispensable part of people' social and professional lives and are also needed in daily life (Takao, Takahashi, & Kitamura, 2009). However, the overuse of mobile phones leads to problematic mobile phone use (PMPU). PMPU has a considerable amount of negative influence on people's quality of life by leading to impaired daily functioning in terms of productivity, social relationships, and well-being (Chi-Ying, 2018; Enez Darcin, Kose, Noyan, Nurmedov, Yılmaz, & Dilbaz, 2016; Elhai, Tiamiyu, & Weeks, 2018; Horwood & Anglim, 2018).

PMPU starts as a harmless habit of contacting family members easily and then transforms into behaviors that lead to constant texting and frequent use of social networking sites and that result in problems in time management (Chi-Ying, 2018; Roberts, Petnji Yaya, & Manolis, 2014). PMPU causes people to focus totally on the activities they carry out on their phones and makes them believe they can tolerate their problems with controlling time (Khang, Kim, & Kim, 2013). As a result, people encounter situations that affect their academic lives negatively such as not studying exams on time, not focusing on school lessons, delaying doing homework (Roberts, Pullig, & Manolis, 2015; Takao, 2014). Experts have stated that emerging problems might stem from low self-control, which also causes many problematic behaviors (Jiang & Zhao, 2016; Shih, 2017).

Self-control can be described as one's ability to control or change one's intrinsic impulses, thoughts, and emotions regarding undesired tendencies or actions (Duyan, Gülden, & Gelbal, 2012; Jiang & Zhao, 2016). People with high self-control lean more toward beneficial and satisfactory activities for themselves in the long run, whereas people with low self-control incline toward activities that offer short-term pleasure and entertainment (Jiang & Zhao, 2016). Rosenbaum (1993) argued self-control behaviors to have three main functions: redressive, reformative, and experiential. Redressive self-control influences one's behaviors regarding goals and supports the smooth execution of ongoing tasks by controlling pain and cognition (Coetzee & Cilliers, 2001; Rosenbaum, 2000). Redressive self-control rearranges disorders such as stress and anxiety and helps one find balance (Sugiwaka & Okouchi, 2004). Reformative self-control refers to the behaviors that guide a process of change in people (e.g., quitting smoking, dieting; Duyan et al., 2012). People imagine the pleasure or reward they will get, plan ahead, and solve problems (Coetzee & Cilliers, 2001). Experiential self-control covers behaviors that lead people to engage in pleasing activities such as music, arts, and sports by overcoming the results of their cognitive control process (Duyan et al., 2012; Rosenbaum, 1993). It allows people to experience pleasing activities that they have not experienced before and to make the most of them (Coetzee & Cilliers, 2001). Experiential self-control also includes social support.

Academic procrastination is about how a person intends to conduct a certain academic activity but has problems getting motivated to carry out the activity within the specified time (Senécal, Koestner, & Vallerand, 1995). Among students, academic procrastination manifests itself as delaying the completion of weekly reading assignments, delaying administrative duties related to academic life, missing deadlines for important projects, and leaving the preparation of term papers to the last minute (Yılmaz, 2017). In other words, students delay academic actions despite being aware of the negative outcomes (Kağan, Çakır, İlhan, & Kandemir, 2010).

Big-Five Personality Traits (BFF)

Personality can be described as all the physical, mental, emotional, social, moral, and behavioral characteristics of an individual that are able to distinguish one from other individuals (Aremu, Williams, & Adesina, 2011). Many different models based on psychoanalytical, biological, humanistic, behaviorist, social learning, cognitive, and distinctive characteristics have been put forward to explain personality. One of the approaches based on distinctive characteristics is the Big Five Personality Traits, developed by McCrea and Costa (1985). In this study, the Big Five have been selected to broadly and systematically represent the domain of personality variables. According to Costa, McCrae, and Dye (1991), personality traits can be collected under five factors: neuroticism, extraversion, agreeableness, conscientiousness, and openness.

As a matter of fact, many researchers have argued that personality traits and self-control play a role in the occurrence, development, and maintenance or prevention of PMPU and academic procrastination (Hsiao, Shu, & Huang, 2017; Kim, Fernandez, & Terrier, 2017; Wolters, Won, & Hussain, 2017). Personality traits are seen as a stronger predictor of PMPU (Horwood & Anglim, 2018) and have received increased attention (Hussain, Griffiths, & Sheffield, 2017). According to literature review, understanding the relationships that may lead to the emergence of PMPU and academic procrastination is believed to be easier (Hong, Chiu, & Huang, 2012; Wolters et al., 2017). In this sense, this study aims to conduct multi-group analyses based on personality traits and to reveal the relationships among self-control, academic procrastination, and PMPU as well as how these variables affect one another. This study is believed to contribute to the field as it offers measures on taking self-control into account in order to prevent PMPU and academic procrastination in people with different personality traits. As personality traits and self-control are distinguishing individual characteristics, scrutinizing the reasons underlying the emergence of PMPU and academic procrastination in people with different traits will become easier.

The Relationship of the Big Five Personality Traits with PMPU, Self-Control, and Academic Procrastination

Only a few studies in the literature have dwelt on the relationships among PMPU, academic procrastination, and self-control based on personality traits and how these three affect one another. Studies have shown openness to have a negative relationship with PMPU (Horwood & Anglim, 2018; Hussain et al., 2017) and to be a predictor of PMPU (Andreassen et al., 2013; Demirhan, Randler, & Horzum, 2016). As openness involves the cognitive, meta-cognitive, and behavioral components of self-control, the two are believed to possibly be associated with one another (Senler & Sungur-Vural, 2013). Openness has been stated to have a negative relationship with academic procrastination (Çam, 2013; Karatas & Bademcioglu, 2015).

Some studies have found conscientiousness to have a negative relationship with PMPU (Horwood & Anglim, 2018; Hussain et al., 2017) and to be an important predictor of PMPU (Demirhan et al., 2016). Roberts et al. (2015) determined conscientiousness to directly and negatively affect PMPU. The literature has stated that people who conscientiously persevere in achieving their goals are believed to have high self-control (Bidjerano & Dai, 2007; Jensen-Campbell, Knack, Waldrip, & Campbell, 2007; Tangney, Baumeister, & Boone, 2004). Conscientiousness has been reported to have a negative relationship with academic procrastination (Boysan & Kiral, 2017; Karatas & Bademcioglu, 2015; Swaraswati, Winarno, & Goeritno, 2017).

Individuals with high extraversion usually desire to communicate with peers. This increases the arguments that the rate of PMPU may be higher among individuals with this personality trait (Hong et al., 2012; Hsiao et al., 2017). Some studies have suggested high extraversion to have a positive relationship with PMPU (Demirhan et al., 2016) and to be a predictor of PMPU (Andreassen et al., 2013; Demirhan et al., 2016; Takao, 2014). Hong et al. (2012) revealed that being an extravert positively affects PMPU. These researchers stated that when extraverts experience stress or any kind of negativity, they do not lose their self-control thanks to their social relationships, and thus can solve their problems (Hooker, Choun, Mejía, Pham, & Metoyer, 2013). Moreover, results exist indicating a positive relationship between extraverts and academic procrastination (Kağan et al., 2010; Swaraswati et al., 2017).

The more neurotics often use mobile phones to eliminate their loneliness and to receive social (Horwood & Anglim, 2018) and emotional support (Hsiao et al., 2017). Studies have detected high neuroticism to have a positive relationship with PMPU (Horwood & Anglim, 2018; Toda, Ezoe, Mure, & Takeshita, 2016) and to predict PMPU (Pearson & Hussain, 2015; Takao, 2014). The emergence of self-control varies in individuals with neuroticism depending on excessive stress or emotional

instability (Hooker et al., 2013). Such people have been emphasized to not be resistant enough to overcome the problems they encounter and to have low levels of self-control (Senler & Sungur-Vural, 2013). Furthermore, results exit indicating neuroticism to have a positive relationship with academic procrastination (Karatas & Bademcioglu, 2015; Swaraswati et al., 2017).

Agreeable people often use mobile phones to respond to the messages they receive or the comments others make (Hsiao et al., 2017). Studies have shown agreeableness to have a negative relationship with PMPU (Horwood & Anglim, 2018; Toda et al., 2016) and to predict PMPU (Andreassen et al., 2013). As agreeable people spend more effort overcoming the problems they encounter, they may have higher self-control (Bidjerano & Dai, 2007; Jensen-Campbell et al., 2007; Senler & Sungur-Vural, 2013; Tangney et al., 2004). Results also exist indicating a negative relationship between agreeableness and academic procrastination (Boysan & Kiral, 2017; Clariana, 2013; Çam, 2013; Karatas & Bademcioglu, 2015).

The Baseline Model

Based on the explanations given above, we have decided to employ the research model given in Figure 1 in this study.

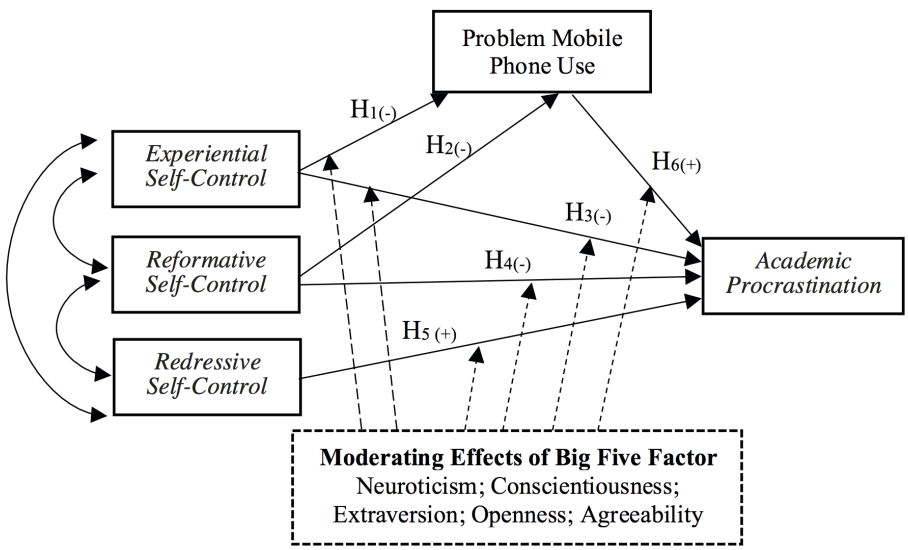

Figure 1. The baseline model.

As people's willpower is considered to be influential over organizing the full process of mobile phone use, high self-control is taken as an important factor in preventing the psychological and physiological effects of PMPU (Khang et al., 2013;

van-Deursen, Bolle, Hegner, & Kommers, 2015). It is argued that people with low self-control are not capable of controlling their emotions and impulses in response to many influential features of applications in mobile phones, which results in the emergence of PMPU (Jiang & Zhao, 2016). Previous studies revealed that high self-control affects PMPU negatively (Khang et al., 2013; van-Deursen et al., 2015). Hence, the hypotheses are as follows:

H_1: Experiential self-control has a significant negative effect on PMPU.

H_2: Reformative self-control has a significant negative effect on PMPU.

Previous studies have reported problems with self-control to play a role in the emergence of academic procrastination (Klassen, Krawchuk, & Rajani, 2008; Yılmaz, 2017). Rakes and Dunn (2010) noted academic procrastination to occur when individuals have low self-control. The literature states people with high self-control to use their time more efficiently and to control their impulses easily; neither intrinsic nor extrinsic impulses influence their academic lives (Tangney et al., 2004). Previous studies have revealed experiential and reformative control to have a negative relationship with academic procrastination (Rakes & Dunn, 2010) and to predict academic procrastination (Klassen et al., 2008; Rakes & Dunn, 2010; Senécal et al., 1995), whereas redressive self-control has a positive relationship with academic procrastination (Senécal et al., 1995). Hence, the hypotheses are as follows:

H_3: Experiential self-control has a significant negative effect on academic procrastination.

H_4: Reformative self-control has a significant negative effect on academic procrastination.

H_5: Redressive self-control has a significant positive effect on academic procrastination.

PMPU has been reported to cause people to avoid academic activities, which results in failing academic achievement (Roberts et al., 2015). Mobile phones are considered as tools of delay and distraction for people who have difficulty maintaining discipline (Butt & Phillips, 2008). PMPU is indicated as a predictor of academic procrastination and has a positive relationship with it (Erdoğan, Pamuk, Eren-Yürük, & Pamuk, 2013). Hence, one hypothesis is as follows:

H_6: PMPU has a significant positive effect on academic procrastination.

Methodology

Participants

The study has been conducted at two different Turkish universities. The data have been collected from 615 students using convenience sampling; However, 44 of the students were excluded from the study as they had not filled out all of the scales. Analyses have been performed over the data obtained from 571 students. Among them, 70.2% (n = 401) are female, and 29.8% (n = 170) are male (mean age = 19.03 years, SD = 1.32, min. = 18, max. = 22). The participant demographics are depicted in Table 1.

Table 1
Participant Demographics

Variables		*N*	Percentage (%)
Gender	Female	401	70.2
	Male	170	29.8
Frequency of daily mobile usage	Less than 1 hr.	25	4.4
	1-2 hrs.	136	23.8
	3-4 hrs.	218	38.2
	More than 4 hrs.	192	33.6
Frequency of daily mobile usage for education	Never	28	4.9
	Less than 1 hr.	310	54.3
	1-2 hrs.	199	34.9
	3-4 hrs.	30	5.3
	More than 4 hrs.	4	0.7
Department	Department of Primary Education	120	21.0
	Department of Turkish and Social Sciences Education	178	31.2
	Department of Mathematics and Science Education	188	32.9
	Department of Computer Education and Instructional Technology	85	14.9

Instruments

Academic Procrastination Scale (APS). The APS was developed by Çakıcı (2003) to determine individuals' academic procrastination. It has one factor consisting of 19 items that contain tasks that students are responsible in their educational life. Twelve items on the scale are reversed coded. Each item is rated on a 5-point Likert-type scale. Total scores range from 19 to 95. Higher scores on the scale indicate students to be more prone to academic procrastination. The internal consistency and test-retest reliability values of the APS are .92 and .89 respectively. In addition, the internal consistency of the scale is .91 for this sample.

Problematic Mobile Phone Use Scale (PMPUS). PMPUS was developed by Bianchi and Phillips (2005) to evaluate perceived dependence on mobile phones and was adapted to Turkish by Şar and Işıklar (2012). PMPUS has one dimension composed of 27 items using a 5-point Likert-type scale. The items are about tolerance; avoiding other problems; withdrawal; cravings; negative life consequences in the areas of

social, familial, work, and financial difficulties; individuals' loss of control over the amount of mobile phone usage and time spent on mobile phone–related activities; and social motivational aspects of mobile phone use. Total scores obtainable from the scale vary between 27 and 135, with higher scores reflecting individuals to have high problematic mobile phone use levels. Cronbach's alpha coefficient of internal consistency has been calculated as .94 and the reliability coefficient as .88 for the Turkish form of the scale. For this study, the internal consistency of the scale is .90.

Self-Control Scale (SCS). The SCS is used to measure individuals' general repertoire of learned resourcefulness skills (Rosenbaum, 1980). It consists of 36 items with 11 items on the scale reversed coded. Each item is rated on a 6-point Likert-type scale. Total scale scores range from -108 to 108, with higher scores indicating greater resourcefulness. The internal consistency and test-retest reliability values of the SCS exceed .80 (Rosenbaum, 1980). The SCS was translated into Turkish by Duyan et al. (2012), with the SCS factor analysis of the Turkish version revealing a 3-factor structure: experiential self-control (11 items), reformative self-control (14 items), and redressive self-control (11 items). Internal consistencies have been reported to range from .73 to .84 for all dimensions. In addition, the test-retest reliability of the SCS ranges between .72 and .82. Cronbach's alphas for this study are .64 for experiential self-control, .85 for reformative self-control, and .79 for redressive self-control.

Adjective-Based Personality Test (ABPT*).* The ABPT was developed by Bacanlı et al. (2009) based on the Big Five personality traits. The ABPT consists of 40 pairs of opposite adjectives rated on a 7-point Likert-type scale and is composed of five sub-dimensions: emotional stability/neuroticism (7 items), conscientiousness (7 items), extraversion (9 items), openness to experience (8 items), and agreeableness (9 items). Cronbach's alpha coefficient for these dimensions range from .73 to .89. Meanwhile, the test-retest reliability coefficient for the ABPT ranges between .68 and .86. The authors of the ABPT did not provide cut-off scores. Higher scores in a sub-dimension show the personal characteristic of that sub-dimension to be more dominant. The students have been distributed into low and high scoring personality traits based on their mean scores.

Data Collection and Analysis

During the data collection process, students were informed about the purpose of the study and how the data obtained in the study would be used; they were asked whether they wanted to participate in the study. Students who agreed to take part in the study were told how to fill out the data collection tools.

Path analysis has been used to analyze the data within the parameters of the model shown in Figure 1. The path analysis has been carried out in two phases: assumption

checking and path-model estimations. Firstly, descriptive statistics for the mean, standard deviation, skewness, and kurtosis values were calculated for each variable in the model and presented in Table 2. According to Kline (2010), the skewness and kurtosis values are within acceptable limits (|3| and |10|, respectively). Secondly, the study's data set has been examined in terms of multivariate normality. Raykov and Marcoulides (2008) suggested calculating the critical value according to the p (p + 2) equation for multivariate normality. In this equation, p shows the number of observed variables. Mardia's (1970) normalized multivariate kurtosis coefficient has been calculated as 1.247. Because the coefficient has been found below the critical value, the multivariate normality assumption is met for performing path analysis. Meanwhile, correlation coefficients among the variables indicate no presence of multicollinearity problems in the data. Thirdly, the path model has been estimated using the IBM Statistical Packages for the Analysis of Moment Structures (AMOS). In evaluating the convenience of the set model for the data, values have been calculated for the chi-square goodness-of-fit ($\chi 2$), comparative fit index (*CFI*), normed fit index (*NFI*), root-mean-square error of approximation (*RMSEA*), and standardized root-mean-square residuals (*SRMR*). Finally, multi-group analysis has been used to test the moderating effects of the Big-Five factors.

Results

Descriptive Analysis

Descriptive statistics and correlations between the study's variables are presented in Table 2.

Table 2
*Descriptive Statistics and Correlations Among the Study's Variables (*N = *571)*

	Mean	*SD*	Skewness	Kurtosis	Exp. SC	Ref. SC	Red. SC	AP
Exp. SC	2.37	10.64	-0.02	-0.30	-			
Ref. SC	13.76	14.35	-0.44	0.00	-.075	-		
Red. SC	6.16	12.22	-0.13	-0.54	.024	.621**	-	
AP	54.07	15.25	0.20	-0.50	-.227**	-.406**	-.198**	-
PMPU	59.87	16.92	0.58	-0.37	-.364**	-.114**	-.109**	.420**

Note. AP = Academic Procrastination, Exp. SC = Experiential Self-Control, Ref. SC = Reformative Self-Control, Red. SC = Redressive Self-Control. * $p < .05$. ** $p < .01$.

According to Table 2, the correlations between PMPU and academic procrastination (r = 0.420, $p < .01$), PMPU and experiential self-control (r = -0.364, $p < .01$), and academic procrastination and reformative self-control (r = -0.406, $p < .01$) are moderate. In addition, the correlations between academic procrastination and experiential self-control (r = -0.227, $p < .01$), PMPU and reformative self-control (r = -0.114, $p < .01$), PMPU and redressive self-control (r = -0.109, $p < .01$), and academic procrastination and redressive self-control (r = -0.198, $p < .01$) are negative and low.

Path Analysis

To identify the relationships between the variables, path analysis was used. Different indices were tested to determine model fit. The fit indexes are presented in Table 3.

Table 3
Results of the Model Goodness-of-Fit

Fit Index	Full Sample (N =571)	ES/Low (n = 318)	ES/High (n = 253)	C/Low (n = 131)	C/High (n = 440)	E/Low (n = 210)	E/High (n = 361)	OE/Low (n = 142)	OE/ High (n = 429)	A/Low (n = 97)	A/High (n = 474)	Recommended Value	References
χ^2	1.143 $p > .05$	0.309 $p > .05$	0.037 $p > .05$	0.662 $p > .05$	0.000 $p > .05$	0.265 $p > .05$	0.912 $p > .05$	0.047 $p > .05$	0.183 $p > .05$	0.010 $p > .05$	0.151 $p > .05$	NS at $p < .05$	Hair, Black, Babin, and Anderson (2010)
χ^2 / *df*	0.143	0.309	0.037	0.662	0.000	0.265	0.912	0.047	0.183	0.010	0.151	≤ 3.0	Hair, Black, Babin, and Anderson (2010)
SRMR	.003	.006	.002	.014	.000	.007	.010	.003	.004	.002	.004	≤ 0.08	Hu and Bentler (1999)
RMSEA	.000 (LO90: 0.00, HI90: 0.08)	.000 (LO90: 0.00, HI90: 0.12)	.000 (LO90: 0.00, HI90: 0.09)	.000 (LO90: 0.00, HI90: 0.12)	.000 (LO90: 0.00, HI90: 0.00)	.000 (LO90: 0.00, HI90: 0.14)	.000 (LO90: 0.00, HI90: 0.13)	.000 (LO90: 0.00, HI90: 0.13)	.000 (LO90: 0.00, HI90: 0.09)	.000 (LO90: 0.00, HI90: 0.09)	.000 (LO90: 0.00, HI90: 0.08)	≤ 0.08	Jöreskog and Sörbom (1993)
CFI	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	≥ 0.90	Tabachnick and Fidell (2001)
NFI	1.000	.999	1.000	.996	1.000	.999	.998	1.000	1.000	1.000	1.000	≥ 0.90	Tabachnick and Fidell (2001)

Note. NS = Not significant.

The fit indices for the full group and each personality are considered acceptable, as shown in Table 3. The next step is to measure the model testing the hypotheses. The direct, indirect, and total effects of the research model for the full sample are shown in Table 4.

Table 4
Direct, Indirect, and Overall Effects of the Research Model for Full Sample

		Standardize Estimates			
Outcome	Determinant	Direct	Indirect	Total	R^2
PMPU	Exp. SC	-0.375*	-	-0.375*	*0.15*
	Ref. SC	-0.142*	-	-0.142*	
AP	Exp. SC	-0.145*	-0.123*	-0.268*	*0.33*
	Ref. SC	-0.457*	-0.047*	-0.504*	
	Red. SC	0.125*	-	0.125*	
	PMPU	0.328*	-	0.328*	

Note. AP = Academic Procrastination, Exp. SC = Experiential Self-Control, Ref. SC = Reformative Self-Control, Red. SC = Redressive Self-Control; * $p < .05$.

Table 4 indicates the most important variable on academic procrastination to be reformative self-control (β = -0.457; $p < .05$) followed by PMPU (β = 0.328; $p < .05$), experiential self-control (β = -0.145; $p < .05$), and redressive self-control (β = 0.125; $p < .05$), respectively. Experiential self-control (β = -0.375; $p < .05$) and reformative self-control (β = -0.142; $p < .05$) have significant influence on PMPU. The findings show all the hypotheses of the research to be supported for the full sample.

The Big-Five Factors as a Moderator

Emotional stability/neuroticism as a moderator. This study uses the multi-group analysis to test the hypotheses regarding the Big-Five factors' moderation. Results from the multi-group analysis for neuroticism are shown in Table 5.

Table 5
Direct, Indirect, and Overall Effects of the Research Model for Emotional Stability/Neuroticism

		Standardize Estimates (Low ES)				Standardize Estimates (High ES)				*z*-score
Outcome	Determinant	Direct	Indirect	Total	R^2	Direct	Indirect	Total	R^2	
PMPU	Exp. SC	-0.295*	-	-0.295*	0.10	-0.438*	-	-0.438*	0.19	-1.86*
	Ref. SC	-0.130*	-	-0.130*		-0.138*	-	-0.138*		-0.04
AP	Exp. SC	-0.127*	-0.102*	-0.229*	0.32	-0.186*	-0.131*	-0.317*	0.34	-0.59
	Ref. SC	-0.464*	-0.045*	-0.509*		-0.453*	-0.041*	-0.494*		0.85
	Red. SC	0.179*	-	0.179*		0.055	-	0.055		-1.66*
	PMPU	0.347*	-	0.347*		0.299*	-	0.299*		-1.10

Note. AP = Academic Procrastination, Exp. SC = Experiential Self-Control, Ref. SC = Reformative Self-Control, Red. SC = Redressive Self-Control, ES = Emotional Stability/Neuroticism; * $p < .05$.

While testing the model by considering neuroticism, the most influential factor on academic procrastination is reformative self-control for both students with low neuroticism (β = -0.464; $p < .05$) and students with high neuroticism (β = -0.453; $p < .05$). Alongside this, experiential self-control and reformative self-control significantly influence PMPU for both groups. Experiential self-control has been detected to have a more significant effect on PMPU for high neuroticism than for low neuroticism. However, the effect of redressive self-control on academic procrastination has only been found significant for students with low neuroticism (β = 0.179; $p < .05$). Redressive self-control has been identified to have a more significant effect on academic procrastination for low neuroticism than for high neuroticism. The differences between the groups of individuals with low and high neuroticism are statistically significant.

Conscientiousness as a moderator. Results from the multi-group analysis for conscientiousness are shown in Table 6.

Table 6
Direct, Indirect, and Overall Effects of the Research Model for Conscientiousness

		Standardized Estimates (Low C)				Standardized Estimates (High C)				
Outcome	Determinant	Direct	Indirect	Total	R^2	Direct	Indirect	Total	R^2	*z*-score
PMPU	Exp. SC	-0.385*	-	-0.385*	0.15	-0.371*	-	-0.371*	0.15	0.77
	Ref. SC	-0.029	-	-0.029		-0.154*	-	-0.154*		-1.35
AP	Exp. SC	-0.240*	-0.082	-0.322*	0.33	-0.112*	-0.138*	-0.250*	0.31	1.62
	Ref. SC	-0.604*	-0.006	-0.611*		-0.363*	-0.057*	-0.421*		2.08**
	Red. SC	0.312*	-	0.312*		0.072	-	0.072		-2.26**
	PMPU	0.214	-	0.214		0.371*	-	0.371*		1.92*

Note. AP = Academic Procrastination, Exp. SC = Experiential Self-Control, Ref. SC = Reformative Self-Control, Red. SC = Redressive Self-Control, C = Conscientiousness; ** $p < .01$; * $p < .05$.

The most influential variable on academic procrastination for students with low conscientiousness is reformative self-control (β = -0.604; $p < .05$) and PMPU for students with high conscientiousness (β = 0.371; $p < .05$). In addition, reformative self-control does not significantly influence PMPU for students with low conscientiousness. Similarly, redressive self-control is not a good determinant for predicting academic procrastination in students with high conscientiousness. A significant difference has been found between the groups of students with low and high conscientiousness in terms of the effects of reformative self-control, redressive self-control, and PMPU on academic procrastination.

Extraversion as a moderator. Results from the multi-group analysis for extraversion are shown in Table 7.

Table 7
Direct, Indirect and Overall Effects of the Research Model for Extroversion

		Standardize Estimates (Low E)				Standardize Estimates (High E)				
Outcome	Determinant	Direct	Indirect	Total	R^2	Direct	Indirect	Total	R^2	*z*-score
PMPU	Exp. SC	-0.384*	-	-0.384*	0.17	-0.365*	-	-0.365*	0.14	0.91
	Ref. SC	-0.197*	-	-0.197*		-0.095*	-	-0.095*		1.48
AP	Exp. SC	-0.238*	-0.125*	-0.363*	0.39	-0.099	-0.120*	-0.219*	0.30	1.87*
	Ref. SC	-0.412*	-0.064*	-0.476*		-0.477*	-0.031*	-0.508*		-0.69
	Red. SC	0.054	-	0.054		0.165*	-	0.165*		1.27
	PMPU	0.325*	-	0.325*		0.328*	-	0.328*		0.56

Note. AP = Academic Procrastination, Exp. SC = Experiential Self-Control, Ref. SC = Reformative Self-Control, Red. SC = Redressive Self-Control, E = Extraversion; * $p < .05$.

When testing the model by considering extraversion, the most influential factor on academic procrastination is reformative self-control for both students with low extraversion (β = -0.412; $p < .05$) and students with high extraversion (β = -0.477; $p < .05$). The best determinant in predicting PMPU is experiential self-control for both groups. However, redressive self-control does not significantly influence academic procrastination for students with low extraversion. Meanwhile, experiential self-control has a more significant effect on academic procrastination for low extraverts than for high extraverts. The differences in power between low and high extraverts are statistically significant. As shown in Table 7, the indirect effects of experiential self-control and reformative self-control on academic procrastination are significant for both groups.

Openness to experience as a moderator. Results from the multi-group analysis for openness to experience are shown in Table 8.

Table 8
Direct, Indirect, and Overall effects of the Research Model for Openness to Experience

		Standardize Estimates (Low OE)				Standardize Estimates (High OE)				
Outcome	Determinant	Direct	Indirect	Total	R^2	Direct	Indirect	Total	R^2	*z*-score
PMPU	Exp. SC	-0.461*	-	-0.461*	0.22	-0.345*	-	-0.345*	0.13	1.62
	Ref. SC	-0.146	-	-0.146		-0.130*	-	-0.130*		0.24
AP	Exp. SC	-0.235*	-0.095*	-0.330*	0.40	-0.120*	-0.126*	-0.246*	0.32	1.46
	Ref. SC	-0.602*	-0.030*	-0.632*		-0.405*	-0.047*	-0.452*		2.10**
	Red. SC	0.178*	-	0.178*		0.106	-	0.106		-0.80
	PMPU	0.207*	-	0.207*		0.366*	-	0.366*		1.87*

Note. AP = Academic Procrastination, Exp., SC = Experiential Self-Control, Ref. SC = Reformative Self-Control, Red. SC = Redressive Self-Control, OE = Openness to Experience; ** $p < .01$; * $p < .05$.

While testing the model by considering openness to experience, all hypotheses except H_5 have been supported for students with high openness to experience. Moreover, H_2 (Reformative self-control → PMPU) has not been accepted for students with low openness to experience. The most influential determinant on academic procrastination is reformative self-control, while experiential self-control has a

significant effect on PMPU for both groups. A significant difference has been found between these two groups of students according to H_4 (Reformative self-control → academic procrastination) and H_6 (PMPU → academic procrastination).

Agreeableness as a moderator. Table 9 shows the results from the multi-group analysis for agreeableness.

Table 9
Direct, Indirect, and Overall Effects of the Research Model for Agreeableness

		Standardize Estimates (Low A)				Standardize Estimates (High A)				
Outcome	Determinant	Direct	Indirect	Total	R^2	Direct	Indirect	Total	R^2	*z*-score
PMPU	Exp. SC	-0.431*	-	-0.431*	0.19	-0.363*	-	-0.363*	0.14	0.84
	Ref. SC	-0.133	-	-0.133		-0.143*	-	-0.143*		-0.19
AP	Exp. SC	-0.397*	-0.064	-0.461*	0.42	-0.094*	-0.133*	-0.226*	0.32	3.20***
	Ref. SC	-0.536*	-0.020	-0.556*		-0.425*	-0.052*	-0.477*		0.63
	Red. SC	0.148	-	0.148		0.119*	-	0.119*		-0.32
	PMPU	0.148	-	0.148		0.366*	-	0.366*		2.41**

Note. AP = Academic Procrastination, Exp. SC = Experiential Self-Control, Ref. SC = Reformative Self-Control, Red. SC = Redressive Self-Control, A =Agreeableness; *** $p < .001$; ** $p < .01$; * $p < .05$.

When testing the model by considering agreeableness, all hypotheses are supported for students with high agreeableness. However, H_2 (reformative self-control → PMPU), H_5 (redressive self-control → academic procrastination), and H_6 (PMPU → academic procrastination) have not been accepted for students with low agreeableness. The most influential factor on academic procrastination is reformative self-control for both students with low agreeableness ($\beta = -0.536$; $p < .05$) and high agreeableness ($\beta = -0.425$; $p < .05$). Furthermore, experiential self-control has a significant effect on PMPU for both groups while having a more significant effect on academic procrastination for low agreeableness than for high agreeableness. However, PMPU has a more significant effect on academic procrastination for high agreeableness. The difference in effect strength between students with low agreeableness and those with high agreeableness are statistically significant.

Discussions

This study has aimed to conduct multi-group analyses based on personality traits and to reveal the relationships between self-control, academic procrastination, and PMPU. In this context, the hypotheses' test results are summarized in Table 10.

The present study has found experiential self-control and reformative self-control to negatively effect PMPU and academic procrastination, whereas redressive self-control and PMPU positively affect academic procrastination. In this sense, experiential self-control can be said to help people receive support in delaying pleasure and to encourage them to participate in activities related to arts and music (Duyan et al., 2012); this

Table 10
Summary of Hypotheses' Test Results for Each Group

Hypotheses	Path	Full	Low ES	High ES	Low C	High C	Low E	High E	Low OE	High OE	Low A	High A
H_1	Exp. SC → PMPU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
H_2	Ref. SC → PMPU	✓	✓	✓	NS	✓	✓	✓	NS	✓	NS	✓
H_3	Exp. SC → AP	✓	✓	✓	✓	✓	✓	NS	✓	✓	✓	✓
H_4	Ref. SC → AP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
H_5	Red. SC → AP	✓	✓	NS	✓	NS	NS	✓	✓	NS	NS	✓
H_6	PMPU → AP	✓	✓	✓	NS	✓	✓	✓	✓	✓	NS	✓

Note. AP = Academic Procrastination, Exp. SC = Experiential Self-Control, Ref. SC = Reformative Self-Control, Red. SC = Redressive Self-Control, ES = Emotional Stability, C = Conscientiousness, E = Extra-version, OE = Openness to Experience, A = Agreeableness, NS = Not Supported.

may lead to a decrease in PMPU and academic procrastination. Reformative self-control prevents the occurrence of PMPU and academic procrastination by delaying people's willingness to be engaged in overusing mobile phones or different activities. On the other hand, redressive self-control leads people to head for different activities or to use mobile phones when stressed or anxious. This helps them control their emotions and thoughts yet may cause PMPU and academic procrastination.

The first hypothesis of the study is "Experiential self-control has a significant negative effect on PMPU." The multi-group analyses conducted in this study has shown experiential self-control, a sub-dimension of self-control, to have a negative effect on PMPU. However, this effect is revealed to be significantly higher in the more neurotic individuals than the less neurotics. This indicates the more neurotics often use mobile phones to eliminate their loneliness, to receive emotional support (Hsiao et al., 2017), and to express themselves better to other parties; they have less PMPU when they involved in activities such as sports and music. Because the emergence of self-control varies in neurotic individuals depending on excessive stress or emotional instability (Hooker et al., 2013), engaging in activities such as sports and music can contribute to developing experiential self-control by reducing stress.

The second hypothesis of the study is "Reformative self-control has a significant negative effect on PMPU." In this direction, the conducted multi-group analyses has revealed reformative self-control to have a significant negative effect on PMPU for the less neurotic, the more neurotic, the more conscientious, the less extraverted, the more extraverted, those more open to experience, and the more agreeable. However, when comparing the strength of this effect for each personality trait, no significant difference has been detected. This indicates that people with these personality traits can be treated for PMPU by receiving support from their social circles or experts and delaying pleasure or impulses by thinking about the positive aspects of the assigned task.

The third hypothesis of the study is "Experiential self-control has a significant negative effect on academic procrastination." In this direction, all the multi-group analyses for each personality trait in the study have demonstrated the negative effect of experiential selfcontrol on academic procrastination except for the more extraverted individuals. Meanwhile, this effect has been found statistically higher for the less extraverts than for the more extraverts. A similar result is also true for those who are more agreeable. As the less extraverts are less sensitive to stimuli and their concentration is not easily broken (Zweig & Webster, 2003), they may be more organized with their academic works when dealing with arts or sports. Mobile phone usage for entertainment purposes by those who are more extraverted may negatively affect how they do activities related to sports and music and cause academic procrastination (Horwood & Anglim, 2018). The presence of high experiential self-control in people who are more agreeable might be influential on their resistance to attention-drawing situations (Jensen-Campbell et al., 2002; Jensen-Campbell et al., 2007).

The fourth hypothesis of the study is "Reformative self-control has a significant negative effect on academic procrastination." In this direction, all the multi-group analyses have revealed reformative self-control to have a negative effect on academic procrastination. However, this effect has been determined to be statistically higher for the less conscientious individuals than the more conscientious A similar result is also true for people with openness. This indicates that delaying pleasure or impulses while carrying out a task by considering the positive aspects of the task or by consulting an expert can reduce academic procrastination. By their very nature, people who are less conscientious and less open to experience greatly avoid tasks and are incapable of goal-oriented thinking or acting in a disciplined way (Komarraju, Karau, & Schmeck, 2009). Conducting activities that will enable those who are less conscientious or less open to experience to behave in a goal-oriented manner that reflects the positive aspects of their responsibilities may be effective in reducing academic procrastination.

The fifth hypothesis of the study is "Redressive self-control has a significant positive effect on academic procrastination." In this direction, redressive self-control has been found to have a significantly positive effect on academic procrastination in all the multi-group analyses conducted except for the more neurotic, the more conscientious, the less extraverted, those open to experience, and the less agreeable. When comparing groups, this effect has been detected to be statistically higher for the less neurotics compared to the more neurotics. A similar situation is true for those who are more conscientious. In this study, the fact that those less conscientious do not easily organize themselves by carefully analyzing their behaviors or work in a disciplined manner (Komarraju et al., 2009) may lead them to become interested in different activities and result in academic procrastination. The fact that the less neurotic try to collect themselves through their interests in different activities when in negative situations may have caused the significant difference between groups in this study.

The sixth hypothesis of the study is "PMPU has a significant positive effect on academic procrastination." In this direction, all multi-group analyses found PMPU to have a positive effect on academic procrastination except for people who are less agreeable and people who are less conscientious. However, the effect is statistically higher for the more conscientious than those who are less conscientious. A similar situation is also true for people who are more open to experience and people who are more agreeable. This may be due to how those who are more open to experiences seek innovation; mobile phones come up with new applications every day, and this may increase their mobile phone use and result in academic procrastination. Those who are more conscientious and those who are more agreeable use their mobile phones to overcome their academic stress, which is an indicator that their mobile phone use may lead to academic procrastination (Komarraju et al., 2009). This result shows that academic procrastination will decrease when individuals with these personality characteristics control their PMPU.

Conclusions

The conclusions obtained in this study can be summarized as follows: experiential self-control has a negative effect on PMPU. This effect is revealed to be significantly higher in the more neurotics than in the less neurotics. Reformative self-control has a significant negative effect on PMPU for the less neurotic, the more neurotic, the more conscientious, the less extraverted, the more extraverted, those more open to experience, and those who are more agreeable. Experiential self-control has a negative effect on academic procrastination for all except the more extraverted. This effect is found to be statistically higher for the less extraverted and those who are less agreeable than for the more extraverted and those who are more agreeable. Reformative self-control has a negative effect on academic procrastination. However, this effect has been determined to be statistically higher for the less conscientious and those less open to experience than for those who are more conscientious and those who are more open to experience. Redressive self-control has been found to have a significant positive effect on academic procrastination in all the conducted multi-group analyses except for the more neurotic, the more conscientious, the less extraverted, those more open to experience, and those who are less agreeable. This effect has been detected to be statistically higher in the less neurotic and the less conscientious compared to those who are more neurotic and those who are more conscientious. PMPU has been found to have a positive effect on academic procrastination except for those who are less agreeable and those who are less conscientious. However, this effect is statistically higher for the more conscientious than for those who are less conscientiousness. A similar situation is also true for those who are more open to experience and those who are more agreeable.

Limitations and Implications for Future Researches

The study has several limitations. First, the study was conducted with university students in Turkey. The heterogeneous nature of Turkish culture requires studies to be conducted with large representative samples. This study can be replicated over different social, financial, and geographical areas for future studies. Second, because of convenience sampling and the majority of the sample being women, the results cannot ensure representativeness and external validity. For this reason, future studies can increase the generalization of the results using random sampling selection methods. Third, in order to determine university students' PMPU, self-control, and academic procrastination levels, we used self-reporting scales. However, self-reporting scales rely on participants' perceptions and may not reflect reality. Therefore this might reduce the validity and reliability of the findings. Thus different methods for collecting data aside from self-reporting scales may be used for assessing personality traits, PMPU, self-control, and academic procrastination. In particular, online learning management systems may allow students' log-in records to be used to determine their levels of academic procrastination. Similarly, PMPU trends may be evaluated more objectively using mobile application log-in records. Forth, despite the fact that the Big Five personality model provides important information about certain personality traits, the main concerns and criticisms are focused on its limited strength in explaining the common recognition that both genetic and environmental factors play distinct roles in shaping individual's phenotypic personality features. Cloninger's temperament and character model of personality (Cloninger, Svrakic, & Przybeck, 1998) is more explanatory for the different dimensions of personality. Temperament dimensions, which reflect the ingrained attitude of the individual toward the environment, are constructed to correspond to underlying hereditary profiles of personality while character facets of personality are more affected by maturity and social learning. Therefore, this model can be used to determine personality traits in future studies.

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