Use of media and technology, academic procrastination, and academic achievement in adolescence

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In today's learning society, use of media and technology affects students in all educational levels. There are a number of studies conducted among university students in this context. However, adolescents, who are sensitively exposed to the negative effects of the excessive use of media and technology, have been neglected. The aim of this study is to investigate the association among adolescents' use of media and technology, their academic procrastination behavior, and academic achievement. This study also examines the possible mediating effect of academic procrastination behavior on the relationship between adolescents' media and technology use and academic achievement. This quantitative study included data from 1278 middle and high school students. We collected data via a questionnaire comprising of the demographic information form, media and technology usage and attitude scale, and academic procrastination behavior scale as well as students' grade point averages to measure students' academic achievement. The results revealed that as media and technology usage increased, students' academic achievement decreased. In addition, academic procrastination behavior had a mediating effect on this relationship. In other words, adolescents' media and technology use cause academic procrastination behaviour to adversely affect their academic achievement. The implications for future research and the limitations of the study were also discussed.

INTRODUCTION

Nowadays, people are exposed to unprecedented amounts of media content, including televisions, computers, mobile phones, video games, and newer types of interactive social media including Facebook, Twitter, and Instagram (Tang & Patrick, 2018). Especially, adolescents often spend time with computers, smartphones, the Internet, video games, and social platforms. There are 4.54 billion Internet users, and 3.8 billion people use social media all around the world (We are social, 2020). For a recent report, Anderson and Jiang (2019)

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revealed that almost every adolescent (13-17 years old) living in the USA had their own smartphone and internet access (95%) while 89% of them used Internet either several times or constantly (45%) during a day. Adolescents are also considered as heavy media users (Lauricella, Cingel, Blackwell, Wartella & Conway, 2014; Rideout, Foehr & Roberts, 2010). Since, children and adolescents find the colorful world of the Internet more interesting than school-related activities and assignments (Kim, 2011). Similarly, the factors such as social approval and peer acceptance may increase the use of technology particularly in adolescence (Ektiricioğlu, Arslantaş & Yüksel, 2020). Thus, extensive use of media and technology may lead them to postpone their duties or social activities. Individuals have to limit the time they devote to other areas as a natural consequence of the increase in the time they devote to a specific area in their daily lives (Lee & Kuo, 2002) and, as a result, they may face time management issues.

Recently, researchers have focused on the shift from investigating the time for academic work to the time for various media and technologies including smart phones, video games, social media sites and its effects on academic achievement (AA). In this context, Wang, Chen and Liang (2011) found that undergraduate students prefer to use social media and spend hours on social media sites comparing with the other activities they could do. Similarly, empirical studies showed that excessive time spent on social network sites causes a decrease in students' AA (Giunchiglia, Zeni, Gobbi, Bignotti, & Bison, 2018; Jacobsen & Forste, 2011; Jankovic, Nikolic, Vukonjanski & Terek, 2015; Junco, 2012; Junco & Cotten 2012; Kirschner & Karpinski, 2010; Michikyan, Subrahmanyam & Dennis, 2015; Paul, Baker & Cochran, 2012; Rosen, Whaling, Carrier, Cheever & Rokkum, 2013). Students are expected to fulfill their duties and responsibilities in time with a certain quality in order to achieve a high level of AA (Engin & Genç, 2020). However, particularly young people tend to procrastinate their academic tasks because of the excessive use of media and technology (Przepiorka et al., 2006; Rozgonjuk et al., 2018). According to Dela Vega, Flores & Magusib, 2017), if there are two different tasks to complete at the same time, individuals tend to choose the one that cause satisfaction in their immediate gratifications, which is also called as "time displacement theory" (Mutz, Roberts & van Vuuren, 1993). For instance, in order to attend social activities, students must cut off their time to study, read, and do homework. More specifically, today, due to the attractive nature of most social media tools, students prefer to devote much more time to any media instead of academic activities (Lau, 2017). As a natural consequence of this situation, as the time spent on the Internet, technology, and media increases, the time they devote to other activities decreases (Shim, 2007). Spending an extensive amount of time on media and technology may cause individuals to engage in academic procrastination behaviors, and thus, negatively affects their academic performance.

Academic Procrastination Behavior

Procrastination is defined as the needless postponement of tasks that need to be completed within a certain period of time (Lay, 1986). Procrastination behavior emerges as a common problem especially in the academic life (Senecal, Koestner & Vallerand, 1995) and called as academic procrastination or academic procrastination behavior (APB) (Rozgonjuk, Kattago & Täht, 2018). It is classified as a sub-dimension of general procrastination behavior and defined as postponement of basic academic tasks including getting ready for exams, preparing homework and term papers, and performing school-related administrative tasks for various reasons (Solomon & Rothblum, 1984). Rothblum, Solomon and Murakami (1986) also described APB as postponing academic tasks and having constant anxiety about this postponement (cited in Senecal et al., 1995). Both Solomon and Rothblum (1984) and Uzun-

Özer, Demir and Ferrari (2009) stated that more than 50% of students postpone their academic duties and more than 35% show procrastination behavior in general. Chen et al. (2020) asserted that although today APB is a global issue for all people, it is still an ambiguous content. It is estimated that approximately 80-90% of university students show APB, which is undesirable manner for academic achievement (Kim & Seo, 2015). APB may have negative consequences such as lower grades (Owens & Newbegin, 1997; cited in Çetin, 2016; Gareau et al., 2019; Kljajic & Gaudreau, 2018). Specifically, Akinsola, Tella and Tella (2007) found an association between APB and AA. In this vein, students with low APB have higher academic performance comparing with the ones with high APB. Regarding the higher level of students' procrastinations, various meta-analyses studies have revealed the possible negative outcomes such as lower performance on assignments, final exams, and grade point averages (GPA) (Gareau et al., 2019; Kim & Seo, 2015; Steel, 2007).

Media and Technology Usage and Academic Procrastination Behavior

Use of media and technology has a critical effect on the cognitive, emotional, and social development of adolescents particularly who spend most of their time with technological tools (Lauricella et al., 2014; Rideout et al., 2010). It would be better to discuss the issue according to the way students use the media and technology. Although general "media and technology use" (MTU) for academic purposes is regarded as an advantageous factor in learning settings, there are a number of statements that refer to the intense, improper, and unbounded manner of the MTU in the literature, such as non-academic MTU (Salomon & Ben-David Kolikant, 2016), excessive/intensive use of Internet (Suhail & Bargees, 2006), problematic Internet use (PIU) (Davis, Flett, & Besser, 2002), pathological Internet use (Davis, 2001), Internet/social media/mobile phone addiction (Griffiths, 2000), so forth. Social media as a technological tool, on the other hand, is the type of media that has shown the greatest development in terms of spreading and gaining popularity in recent years (Pempek, Yermolayeva & Calvert, 2009). Both old-style media (e.g., TV and radio) and new types of media (e.g., smart phones, the Internet, and the social media) have become the tools used by individuals for an increasing period of time (Brown & Bobkowski, 2011).

Recent studies have focused on the association between students' APBs and various forms of MTU (i.e., Geng et al., 2018; Rozgonjuk et al., 2018; Yang and Tung, 2007). It was found that as the daily Internet access time increases, students' tendency to show APB also increases (Akdemir, 2013). According to Odacı & Çelik (2012), students who exhibit problematic Internet use behavior do not devote sufficient time to their academic responsibilities because they spend most of their time on the Internet and postpone or does not complete academic tasks including homework and projects on time. In another study, students who tend to show APB use media and technologies more often comparing with the others with no or less APB (Rozgonjuk et al., 2018). Similar studies found positive and significant association between problematic Internet use and APB (Geng et al., 2018; Günlü & Ceyhan, 2017, Yurdakoş & Biçer, 2019). More specifically, students who are members of social media sites are more engaged with social media, and as the usage time of social media sites increases, engagement with social media increases (Teyfur et al., 2017). Uzun (2016) found a significant relationship between APB and the frequency of using Facebook, one of the popular social media platforms. In addition, Akkuş (2018) examined the relationship between APB and middle school students' attitudes towards Facebook in terms of various variables and found a positive and significant association between APB and the number of Facebook friends, Facebook usage frequency, and daily Internet and Facebook usage time. To sum up, there are numerous studies that examine the association between the MTU and APB while few of them have

focused on this issue in middle and high school students.

Media and Technology Usage and Academic Achievement

The association between the use of various technologies and AA is related to the purpose of technology use. In addition, the impact of MTU on AA has become remarkable topics for researchers in recent years. Despite the popularity and opportunities of media and technology and the widespread use of portable devices including tablets, smartphones, and laptops, there exists concerns about the impact of social media on children and students (Ahn, 2011). One of the concerns is related to MTU for non-academic purposes. Almost 65% of students reported that they used them for non-academic purposes during a class or while studying to complete homework (Jacobsen & Forste, 2011). Uzun and Kilis (2019) clearly presented the significant and negative association between university students' academic performances and the other factors including smartphone and social media use, emailing, media sharing, and number of social media friends. In addition, students with a social media account was found to have lower AA than the ones who did not have a social media account (Bedir, 2016; Boyd & Ellison, 2008; Kim, 2011). Cognitive theory and multitasking studies also show that social media has a negative impact on AA (Camilia, Ibrahim & Dalhatu, 2013; Wentworth & Middleton, 2014). On the other hand, there exist other studies that found positive effects of social media on students' achievement (Abdurahman, Hasan, Sayuti, & Abdullah, 2019; Kelleci-Öztürk & Tetik, 2015; Kirkorian, Wartella & Anderson, 2008; Lambic, 2016). While there are a number of studies exposing the positive or negative effects of MTU on AA, Rashid and Asghar (2016) remarked the literature revealing inconsistent outcomes varying from negative to positive and found no direct significant effect between these variables in their study. On the other hand, Sapci, Elhai, Amialchuk, & Montag (2021), based on the actual usage statistics and GPA for college students, found that extra one hour of mobile phone use per day decreased the GPA by 0.152 averagely. Apparently, obtaining conflicting results from these studies is directly associated with how the students use the media and technology (i.e., academic or non-academic purpose, frequency of use and alike .). Regarding the possible effects on students' AA, academic performance or GPA, several researchers focused on the particular use of technology such as calling and texting (Jacobsen and Forste, 2011), instant messaging (Carnevale, 2006), cell phone use (Lepp, Barkley, and Karpinski (2004) and so forth.

As the time spent on the technology or the frequency of usage increased, the worse results obtained in terms of academic performance and AA of students (Fox, Rosen, and Crawford, 2009; Harman & Sato, 2011; Sanchez-Martinez & Otero, 2009). On the other hand, Chen and Tzeng (2020) argued that researchers ought to focus on demographic features of students in order to figure out the mechanisms behind MTU and procrastination. As is discussed in the previous section, when students are not able to control the use of media and technology, they possible consume or postpone the time that they should allocate for the academic tasks and, as a result, having negative effects on their AA.

Research Problem

The literature suggested that intensive use of media and technology results in the postponement of academic tasks and, consequently, the emergence of APB (Akdemir, 2013; Ergenç, 2011; Geng et al., 2018; Günlü & Ceyhan, 2017; Gür et al., 2018; Gürültü, 2016; Uzun, 2016). Specifically, studies unearth the negative association between social media usage and AA (Anand, 2007; Chen & Peng, 2008; Felisoni & Godoi, 2018; Jacobsen & Forste, 2011; Junco, 2012; Lepp, Barkley & Karpinski, 2014; Leyrer-Jackson & Wilson,

2017; Paul et al., 2012). Moreover, APB, which is frequently exhibited by students, is negatively associated with AA (Akkuş, 2018; Oran, 2016; Yaycı & Düşmez, 2016). However, we encountered no studies setting out the association between MTU and AA with the mediating effect of APB. Besides, we found that most of the studies recruiting these variables focused on the higher education with a limited sample size. However, as Çetin and Esra (2019) and Owens and Newbegin (1997) stated, procrastination is a critical term for adolescence since procrastination tendency start in this period of life. The frequency of such behaviors increases with age and may become a habit. Therefore, it is critical to examine the association between MTU and APB in adolescents. In this study, the relationship between MTU, APB, and AA and possible mediating effect of APB on the association between MTU and AA are investigated. Based on this gap in the literature, the following model is suggested to explain the associations of the aforementioned factors for adolescents (Figure 1).
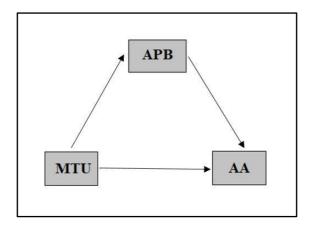

Figure 1. Research model on MTU, APB, and AA

The hypotheses developed based on the literature discussed above are as follows:

(1) There is a positive association between adolescents' MTU and APB.

(2) There is a negative association between adolescents' MTU and AA.

(3) APB has a mediating effect on the relationship between adolescents' MTU and AA.

METHOD

Research Model

The research was conducted by using quantitative research method. In order to make a general judgment about the universe, the whole universe or a group of samples taken from it was designed with the relational survey model, as suggested by Karasar (2015). This model was chosen due to the relationship among MTU, APB, and AA variables.

Participants

Drawn in accordance with the convenience sampling procedures, the participants consisted of 1278 middle and high school students studying in eleven schools (six middle and five high schools) located in eastern part of Turkey. There were 433 7th grade, 449 8th grade, and 396 9th grade students between the age of 12 and 16. Based on gender, there were 643

female and 635 male students. Among the participants, more than half had a smart phone (64%) and/or desktop/laptop (55.9%), almost half of them (45.2%) had a tablet computer, and 17.1 % of them had a mobile phone. The participants used the Internet for entertainment including chatting (25%), playing games (18.4%), watching videos/movies (14.0%) more compared to other tasks including doing homework (10.3%) and research (8.6%) and studying (6.8%).

Before data collection, the researcher met the participants to inform them about the purpose of the study, confidentiality, and privacy issues. The instrument was distributed to 1630 participants who voluntarily accepted to fill the forms up. It took participants 6-8 minutes to complete the questionnaire. Data screening and extraction process resulted in the exclusion of 352 cases due to missing values or invariance in their responses, which left 1278 cases in total. The analyses were completed based on those 1278 cases.

Instruments

For data collection, a questionnaire comprised of three sections was used. Each section was explained below. In addition, students' GPA was used as the AA variable. analyses.

Demographic information form

This section, consisted of 16 items related to participants' demographic information, was developed by the researchers. These items are related to school, school number, gender, grade level, parents' education level, ownership of technological devices including smart phone, mobile phone, desktop, and laptop, ownership of social media accounts including Twitter, Facebook, YouTube, Instagram, WordPress, WhatsApp, and Messenger, duration and frequency of the Internet access, smart phone, and social media usage, purposes of the Internet use, and locations to connect to the Internet.

The media and technology usage and attitudes scale

In order to identify participants' MTU, a scale developed by Rosen and colleagues (2013) and adapted to Turkish by Özgür (2016) was used. "The Media and Technology Usage and Attitudes Scale" consists of 15 subscales; however, the researchers suggested that the questionnaire might be used as a whole or with subscales as needed. Therefore, for this particular study, nine subscales with 40 items were used: smartphone usage (SU), general social media usage (GSMU), Internet searching (IS), e-mailing (EM), media sharing (MS), text messaging (TM), video gaming (VG), phone calling (PC), and television watching (TW). The Cronbach's Alpha values for factors were calculated as 0.85 for SU, 0.92 for GSMU, 0.81 for IS, 0.82 for EM, 0.75 for MS, 0.72 for TM, 0.84 for VG, 0.70 for PC, and 0.61 for TW. The scale is designed as 10-point Likert scale ranging from (1) never to (10) always.

The academic procrastination behavior scale

The scale developed by Çakıcı (2003) consists of 19 items to identify whether students complete their duties including studying, preparing for exam, completing tasks, and attending to the classes on a regular basis. It is a five-point Likert scale ranging from (1) not reflects me at all to (5) reflects me completely. The higher score obtained from the scale means more APB. The Cronbach's alpha and Spearman-Brown split-half reliability values were calculated as 0.92 and 0.85, respectively.

Academic achievement score

For AA score, participants' overall grade point averages (GPA) for the first semester of 2017-2018 school year were used. The scores ranged between 0 and 100. As their GPA increases, their AA increases. Anand (2007) suggests that so as to measure academic performance, it is better to use students' GPA rather than using AA test. Other studies also support this suggestion (Kim, 2011; Lau, 2017; Qaisar, Akhter, Masood & Rashid, 2017; Walsh et al., 2013).

Data Analysis

In order to be able to test the hypotheses, descriptive statistics, t-tests, ANOVA, simple linear regression, and process macro analysis were conducted. Tamhane's T2 post-hoc test was used for significant interactions since the assumption of variance homogeneity within the groups was not provided. Eta squared (η^2) was calculated for the comparisons with a view to determining effect size based on the Cohen's (2013) guidelines (small=.01, medium=.06, large=.138).

FINDINGS

Based on the analysis results, there was a significant difference between MTU scores of female students ($\underline{X}$=160.80) and those of male students ($\underline{X}$=168.64) (t= -2.089; p< .05), which means that male students use media and technology more than female students.

Table 1. MTU scores based on grade level

Grade level	N	$\bar{X}$	Sd	Difference	Effect size
7th grade (a)	433	153.54	67.70	c > a	
8th grade (b)	449	158.62	69.33	c > b	.04
9th grade (c)	396	183.77	59.82		

The result of ANOVA test revealed that the difference between the arithmetic means of the groups was significant (F = 24.657; p <.05). According to the Post-hoc Tamhane's T2 test, 9th grade students ($X^- = 183.77$) reported more use of media and technology than 7th grade ($X^- = 153.54$) and 8th grade ($X^- = 158.62$) students. Therefore, there was a significant difference between middle and high school students in terms of MTU. Descriptive findings of MTU scale based on its factors are given in Table 2.

Table 2. Descriptive statistics of MTU factors

Factor	Mean	Sd
SU	4.78	1.90
GSMU	4.03	2.51
IS	4.42	2.34
EM	2.04	1.57
MS	3.38	2.19
TM	4.44	2.52
VG	3.74	2.80
PC	5.51	2.85
TW	5.25	2.52

SU = Smartphone usage, GSMU = General social media usage, IS = Internet searching, EM = E-mailing, MS = Media sharing, TM = Text messaging, VG = Video gaming, PC = Phone calling, TV = Television watching

Table 2 shows that participants use smartphones a few times a week, use a social network once a week, search the Internet once a week, use e-mail once a month, share media several times a month, text message once a week, uses video games once a week, makes phone calls once a day, and watches television several times a week.

Table 3. Correlations among the scales, their subscales, and GPA

	Mean	Sd	1	2	3	4	5	6	7	8	9	10
1.GPA	81.909	13.169	-									
2.APB	45.748	14.888	-.394*	-								
3.SU	4.783	1.898	-.179*	.239*	-							
4.GSMU	4.027	2.505	-.204*	.315*	.652*	-						
5.IS	4.417	2.343	-.107*	.122*	.546*	.440*	-					
6.EM	2.037	1.567	-.099*	.117*	.375*	.285*	.324*	-				
7.MS	3.378	2.194	-.133*	.216*	.521*	.518*	.490*	.366*	-			
8.TM	4.443	2.525	-.157*	.306*	.698*	.566*	.367*	.279*	.403*	-		
9.VG	3.741	2.804	-.180*	.295*	.413*	.460*	.404*	.327*	.502*	.370*	-	
10.PC	5.508	2,849	-.110*	.177*	.651*	.511*	.378*	.251*	.370*	.684*	.348*	-
11.TW	5.252	2,525	-.146*	.192*	.389*	.375*	.349*	.189*	.497*	.312*	.347*	.303*

GPA = grade point average, APB = academic procrastination behavior, SU = Smartphone usage, GSMU = General social media usage, IS = Internet searching, EM = E-mailing, MS = Media sharing, TM = Text messaging, VG = Video gaming, PC = Phone calling, TV = Television watching
* $p < .01$

As seen in Table 3, there is a negative and significant relationship between AA and subscales of MTU scale. In terms of participants' APB scores, there is a significant positive relationship between MTU subscales and APB. As the MTU levels of the participants increased, their AA scores decreased, and their APB scores increased.

In the regression analysis conducted to reveal the relationship between MTU and APB, the independent variable explained 10% of the dependent variable (R = .324, $r^2 = .105$, β = -. 216, p <.001). This result means that there is a significant relationship between MTU scores and APB scores, and MTU is a predictor of APB.

An ANOVA test was used to identify possible changes in AA based on duration of daily average Internet use. As a result of the test, the difference between the arithmetic means of the groups was found to be significant (F = 12.829; p <.05). The results are presented in Table 4.

Table 4. Academic achievement scores based on daily average Internet usage

Daily average Internet usage	N	$\bar{X}$	Sd	Difference	Effect Size
<1 hour (a)	458	84.52	13.03	a > b, c, d, e	
1-2 hours (b)	509	82.07	12.78	b > c, e	
3-4 hours (c)	200	78.13	13.10		.04
5-6 hours (d)	53	78.37	12.75		
6 hours < (e)	58	76.14	13.06		

According to Table 4, participants who connected to the Internet less than one hour daily had significantly higher AA comparing with the other participants. Similar trend was observed for the participants who used the Internet for 1-2 hours daily. Their academic achievement was higher comparing with the other participants who had 3-4 hour- and more than 6-hour-Internet connection. The effect size was calculated as $\eta^2 = 0.04$, which means that the daily average time to connect to the Internet has little effect on students' AA.

Table 5. Total and direct effects of MTU on AA

MTU on AA	Effect	Se	T	p	LLCI	ULCI
Total effect	-.0424	.0054	-7.9052	.0000	-.0529	-.0318
Direct effect	-.0194	.0053	-3.6510	.0003	-.0298	-.0090

* * p < .05   Se = standard error

The total impact expressed in Table 5 is the sum of the direct and indirect impact of MTU on AA. Since the lower confidence interval (-.0529) and the upper confidence interval (-.0318) did not include the value of 0 (zero), the effect was significant and confirms the significance value (p <.05). The direct impact indicates the direct effect of MTU on AA and was statistically significant. The absence of 0 (zero) value between LLCI (-.0298) and ULCI (-.0090) indicated that the effect was significant.

Table 6. Indirect effect of MTU on AA

	Effect	Se	BootLLCI	BootULCI
APB	-.1173*	.0129	-.1436	-.0933

* p < .05
Se = standard error
** bootstrap iteration is equal to 5000

The effect value of APB variable as a mediator was obtained through the Bootstrapping technique and found to be -.1173, which implied the significant effect of APB as a mediator (See Table 6). Since the value of 0 (zero) is not in between BootLLCI (-.1436) and BootULCI (-.0933), the findings were considered as significant. This implies that APB served as a mediator for the relationship between MTU and AA.

CONCLUSION AND DISCUSSION

The present study was conducted to investigate the association among adolescents' use of media and technology, their academic procrastination behavior, and academic achievement and the mediating role of APB on the relationship between adolescents' MTU and AA. In recent years, researchers have focused on the association among MTU, APB, and AA in various combinations. Also, their participants were mainly chosen from older age groups, especially at the university level. In this study, the association among high school

students' MTU, APB, and AA was examined. In addition, we attempted to explore the mediating effect of APB on the relationship between students' MTU and their AA. Based on the findings of the study, it was determined that male students' MTU was significantly more than female students, which supports the findings of other studies (Henderson, Selwyn, Finger & Aston, 2015; Salomon & Ben-David Kolikant, 2016). Also, 9th grade students' MTU was more than 7th and 8th grade students. This might be explained through the increase in the number of students who have a smart phone due to the transfer to high school and the increase in their autonomy with their age. In addition, 8th grade is critical for students due the high school entrance exam in Turkey. Parents might keep their children under control and even restrict them to use media and technologies. On the other hand, several studies designated an increase on MTU in accordance with the age and the educational level of the students (Owens and Newbegin, 1997). On the contrary, first grades students showed higher APB than the later grades in higher education (Teyfur et al., 2017) while younger adolescents displayed higher dependencies to technology (Pontes et al., 2014).

In this particular study, a positive and significant association was found between adolescents' MTU and their APB; therefore, the first hypothesis was supported. MTU was also a predictor of APB, and it explains approximately 10% of this behavior. In other words, as the MTU increases, APB also increases. This result coincides with the findings of existing literature (Geng et al., 2018; Günlü & Ceyhan, 2017; Yurdakoş & Biçer, 2019). In the literature, there exists other studies showing that MTU predicts APB (He, 2017; Rashmei & Khosravi, 2016; Rozgonjuk, Kattago, & Täht, 2018). The findings of this study proved that as the duration of daily average Internet connection increased, participants' APB increased. Similarly, various studies (Akdemir, 2013; Gürültü, 2016; Ergenç, 2011; Odacı & Çelik, 2012; Uzun, 2016) also pointed out that the average time spent on social media and the Internet increases APB. The findings of the current study and other studies in the literature prove the positive association between adolescents' MTU and their APB. It may be concluded that due to the attractive face of media and technology, students tend to spend more time with the technological devices, which causes them to postpone their academic duties. Therefore, it is suggested that student students should be aware of the association between excessive use of media and technology and academic procrastination behaviors.

The second hypothesis posited that there is a negative relationship between adolescents' MTU and their AA. A low level and significant relationship was found between MTU and AA scores. Our findings are consistent with the studies particularly showing the negative effects of non-academic usage of MTU on AA (Jankovic et al., 2015; Jacobsen & Forste, 2011; Junco, 2012; Junco & Cotten 2012; Kim, 2011; Kirschner & Karpinski 2010; Michikyan et al., 2015; Paul et al., 2012; Rosen et al., 2013; Uzun & Kilis, 2019; Wentworth & Middleton, 2014). On the other hand, a positive association between MTU for academic purposes and AA was found in several studies (Kelleci-Öztürk & Tetik, 2015; Lambic, 2016; Rouis, 2012). Therefore, more research is needed to examine possible effects of MTU for both academic and non-academic purposes with more representative sample from different regions.

The third hypothesis suggested that APB has a mediating effect on the relationship between MTU and AA. According to the results, MTU and consequently APB causes AA to decrease. In other words, APB has a mediating effect in the negative association between MTU and AA. As a result of facilitating and accelerating access to media and technological devices, adolescents spend longer time with these devices and postpone their academic duties. Students prefer to waive their time for academic tasks, but not for social media sites or smartphone use in case of time constraints (Jankovic et al., 2015). The time people have is

limited (Shim, 2007) and, as a result, focusing on a different activity reduces the time for other activities. As Dela Vega and colleagues (2017) reported that the time adolescents devote to their academic duties at home and the time they devote to social media are displaced, this study also found that the time allocated to academic tasks decreases as MTU increases. According to the results of the study, adolescents' MTU causing APB adversely affects their AA.

Based on the findings of this study, it is suggested that providing educationally rich content on the web may encourage adolescents to use media and technology for academic purposes. Therefore, parents, teachers, and school administrators need to collaboratively work on possible solutions to support students' technology use. In relation to these solutions, researchers also may take learners' locus of control into account as a critical variable of APB and AA in terms of the MTU.

LIMITATIONS AND FUTURE RESEARCH

This study has some limitations. First, the sample of the study was 1278 middle and high school students. Due to the convenience sampling method, this study cannot be generalized to all middle and high school students. Therefore, future research should include larger sample size from different regions. Second, socio-economic conditions of the participants were not included as a variable in the study. Since socio-economic condition is associated with access to smartphone, tablet computer, laptop, and/or desktop, this variable should be included in future research. Third, this study was designed by using quantitative research model. However, in order to better understand students' intent as they use media and technology, the barriers that cause them to spend more time on media and technology for non-academic purposes, both quantitative and qualitative research models must be employed to explore the association among MTU, APB and AA. Forth, there are factors other than social media use that contribute to poor AA and increased APB, such as Attention Deficit Disorder and/or learning difficulties. This study did not take those variables into account. Last, in this study, students' APB is measured through a questionnaire and the obtained results were used in the analysis. This study might be replicated with students who already show APB in order to gain more knowledge in this topic.

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