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Relationships between adolescent smartphone usage patterns, achievement goals, and academic achievement

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Abstract

As smartphones are emerging as a common device for adolescent, prior studies have provided theoretical and empirical evidence for the factors affecting adolescent smartphone use. However, mainstream research has tended to focus on the negative effects of smartphone. Even though smartphone use can have adverse outcomes, it may also allow students to engage in flexible mobile learning, gain access to important information about their possible future careers and achieve their personal goals. To fill this gap in adolescent smartphone usage, this study explored the smartphone usage patterns of adolescent subpopulations and the associations with their self-control, achievement goals, and academic achievements. Data were collected from 2341 s-year high school students as part of a larger longitudinal panel study. Three distinct smartphone usage profiles were identified in the latent profile analysis: learning, recreational use, and minimal use. Respondents with high perseverance were assigned to the learning group, and respondents with lower compliance and perseverance were assigned to the recreational group. The achievement goal score was found to be the highest in the learning group and lowest in the recreational group. Academic achievement was found to be higher in both the learning and minimal use groups than the recreational use group. Based on these findings, the implications of this study for research and practice are discussed.

Keywords Smartphone usage · Adolescent · Self-control · Achievement goals · Academic performance

Introduction

Smartphone devices can now deal with a wide range of tasks that were previously only possible on dedicated computer systems, because of recent advances in mobile technology and telecommunication infrastructure (Azizifara & Gowharya, 2015). Therefore, in addition to phone calls and messaging, users can now use smartphones powered with high-speed internet for entertainment and online communications (Razzaq et al., 2018). Recent statistics indicated that adolescents spend more time using their smartphones now than a decade ago (Camerini et al., 2020). Because smartphones have become popular among adolescents, educational researchers have started paying attention to the impact of their use on the students' daily lives and schoolwork (Tangmunkongvorakul et al., 2020). Given that adolescence is a crucial period for physical and intellectual growth, it is vital to understand how smartphone use influences adolescents' behaviors.

Servidio (2019) found that adolescent smartphone usage patterns were affected mainly by self-control. As opposed to adults who have the maturity to make self-directed judgments, adolescents have been found to be vulnerable to excessive smartphone because of lack of self-control (Mahapatra, 2019). Van Deursen et al. (2015) found that this overuse was closely associated with self-regulation ability. When younger population, without sufficient self-control, use their smartphones, their academic performance and schoolwork can be adversely affected (Saritepeci, 2019).

Although prior studies have provided theoretical and empirical evidence for the factors affecting adolescent smartphone use, mainstream research has tended to focus on the negative effects of smartphone addiction, or "cyber-loafing," without considering the multifaceted aspects of the smartphone usage patterns (Kim, 2013; Rosen et al., 2014). Therefore, there is a poor understanding of the variances in

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adolescent smartphone usage patterns, which is problematic because these days, smartphones have become a part of their daily lives for various purposes, such as communication (Bae, 2017), learning (Ozer and Kılıç 2018), and entertainment (Przybylski, 2019), which means it is unrealistic to suggest there is only a single usage time variable (Toh et al., 2019). Even though smartphone use can have adverse outcomes, such as addiction or poor academic performances (Bukhori et al., 2019), it may also allow students to engage in flexible mobile learning (Fu et al., 2020), gain access to important information about their possible future careers, and achieve their personal goals (Chee et al., 2017). Therefore, to explore the benefits students gain from their smartphone use, it is important to identify the way they use their devices and the impacts these patterns have on their lives.

This study explored second-year high school student subpopulation smartphone usage patterns in Korea by analyzing the associated self-control factors and examining the academic goal and achievement usage patterns, which was driven by the following research questions.

1) How can adolescents be classified based on their smartphone usage patterns?
2) Which self-control factors influence the classification of adolescents?
3) What are the differences in the goals and academic achievements between the classified groups?

Background

Adolescent use of smartphones

Smartphone devices have become popular for adolescents because of their portability and accessibility (Chou & Chou, 2019). However, beyond their communication functions, adolescents are using smartphone devices to satisfy their emotional, cultural, and academic needs (Cho, 2015), and also spend a great deal of time using them for recreational activities, such as playing games and viewing multimedia content (Bae, 2017). Because these devices can be used anywhere at any time, their emotional and psychological provision is not bounded by time or space (Hasmawati et al., 2020); therefore, they have also become important in satisfying individual peer group social needs through online communities (Elhai et al., 2018).

Smartphone portability enables users to accomplish tasks without time or space constraints (Kumar & Mohite, 2018) as they can now access the internet and download and share mobile content, such as pictures and videos, anywhere and anytime (Fullwood et al., 2017) with friends on their social media platforms. Because these devices are now widely used in maintaining daily social relationships, adolescents' smartphone dependency can no longer be seen as a temporary obsession (Wang et al., 2017).

Most young people also use their internet connected smartphone devices for learning (Nedungadi & Raman, 2012) as they are able to access information easily when outside school and receive school updates in real-time (Sutisna et al., 2020). Students have reported that enhanced smartphone accessibility has contributed positively to their learning (Asabere, 2013; Hadad et al., 2020), and as mobile education learning has been expanding, the pedagogical concept of "self-directed learning" has attracted increased research attention (Karimi, 2016). For example, Xu and Peng (2017) found that learners improved their Chinese-speaking skills from intensive online feedback even when the instructor and the learners were physically separated.

Although adolescent smartphone use has been widely studied by both researchers and educators, little focus has been paid to adolescent smartphone use heterogeneity, which has prevented adolescents from being guided on wise smartphone use by educators and parents. As smartphones are becoming an integral part of daily adolescent life, it is essential to understand the ways they are using them and the various controls that are needed.

Factors and consequences related to smartphone use: lens of self-control

The variables associated with adolescent smartphone use can be classified into factors that influence smartphone use and the effects of smartphone use. First, the factors influencing the adolescent use of smartphones have been found to be mainly associated with self-control (Troll et al., 2021). As adolescents are at a developmental stage, their self-control abilities are still immature, which means that smartphone addiction could be seen to be closely related to impulse control (Kim et al., 2013). Kim et al. (2018) found that self-control ability was a significant predictor of smartphone addiction and achievement in young people, Heo and Lee (2018) found that students with a poor ability to control their smartphone use were more likely to face schoolwork and peer relationship challenges, and Yu and Son (2016) concluded that adolescents needed to develop self-control strategies because of their increased vulnerability to smartphone addiction, for which they proposed a remediation program involving self-control training for addicted students.

Self-control has been conceptualized within a self-regulation framework (Vohs & Baumeister, 2016). As shown in Fig. 1, self-regulation theory posits that students who achieve their goals tend to engage in a cyclic process consisting of forethought, performance, and self-reflection (Zimmerman, 2002). Self-control skills are critical to performance success as they can help students sustain their focus on their intended goals. Lens and Vansteenkiste

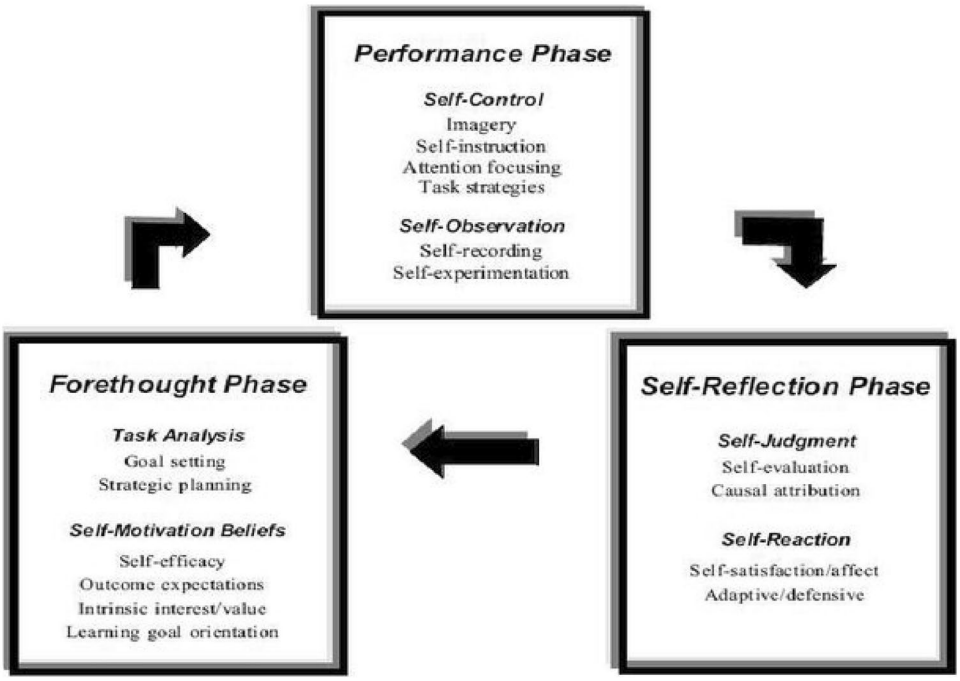

Fig. 1 Self-regulation phases and subprocesses (Zimmerman, 2002, p. 67)

(2008) claimed that student self-control strategies were instrumental in identifying their progress and the needed behavioral changes to meet their goals.

For example, Zhu et al. (2016) found that students who had high self-control levels tended to have good management skills and metacognitive awareness, which suggested that self-control was the key to self-monitoring and the subsequent use of goal-oriented strategies. Therefore, based on prior studies, it was anticipated that self-control skills would be strongly associated with adolescent smartphone usage patterns, excessive smartphone use, and behavioral adjustments.

The consequences of adolescent smartphone use have also been examined. Sozbilir (2018) concluded that as adolescence was a critical life stage for future career and life goal success, smartphone addiction could have adverse effects on this personal development process. However, studies have also identified the advantages of using smartphone devices for communication and learning (Azizifara & Gowharya, 2015; Pambayun et al., 2019), information searches, and developing knowledge construction skills. The relationship between adolescent smartphone use and academic achievement has also been investigated. For example, Kacetl and Klímová's meta-analysis (2019) revealed that students who used their smartphone devices for language learning primarily benefited from the ability to learn without time and space constraints. However, smartphone overuse has also been found to adversely affect schoolwork and achievements; for example, Tateno et al. (2019) found that adolescent smartphone addiction could accelerate their sense of isolation, result in an indifference to schoolwork, and adversely influence their motivation to learn.

While prior studies have explored the effects of smartphone use on a wide range of variables, they have not explained the effects of specific adolescent usage patterns. Because adolescents have been found to diversely use their smartphones, they should be seen to be a heterogeneous group. Because little previous research has focused on the different usage patterns and the associated factors and outcomes, with the aim of providing guidance to addressing individual adolescent academic educational and career planning needs, this paper sought to address this research gap by focusing on the factors that could be used to classify adolescent student usage.

Methods

Participants

This study collected and analyzed data from 2341 s-year Korean high school students, which were extracted from the eighth (2017) survey from the Seoul Education Panel Study, which was conducted from 2010 to 2018 and was focused on elementary and secondary school educational activities in Seoul, South Korea. While high school students in South Korea have been found to be more dependent on their smartphones than middle school students (Lee, 2019), as third-year high school students tend to be more focused on their college entrance exams, their usage patterns were not expected to represent typical adolescent behaviors (Moon

et al. 2020). Further, as first-year high school students are still transitioning to a new environment, it was surmised that their behavioral patterns might not yet have settled, and they might not yet have established achievement goals. As Moon et al. (2020) also found that second-year high school students used their smartphones more frequently than first- or third-year students, this second-year cohort was deemed most suitable for this study.

Variables

Indicators used for the latent profile analysis: smartphone use

The items that measured smartphone usage asked students to indicate the number of hours on weekdays and the weekend they used smartphones for each of eight activities using a 9-point scale with one-hour intervals, ranging from 0 (0 h) to 8 (more than 7 h). The activities questioned included items such as accessing a social networking service, watching online lectures, using recreational multimedia, such as videos and songs, and playing mobile games. The indicators used for the latent profile analysis are summarized in Table 1.

Self-control variables

Three items from the panel survey were used to measure the students' abilities to control their motivations and desires. These items had been adapted from a questionnaire developed by Gottfredson and Hirschi (1990) and Nam and Ok (2001). As self-control requires multi-dimensional abilities (Lindner et al., 2015), individual items were used to represent the different self-control dimensions; perseverance, compliance, and forethought (Table 2).

Table 1 Survey items used for the latent profile analysis

Question: How many hours per day do you use a smartphone for the following activities?		
Indicator number	Day	Activity
1	Weekdays	Social networking service
2		Watching online lectures
3		Using recreational multimedia
4		Playing mobile games
5	Weekend	Social networking service
6		Watching online lectures
7		Using recreational multimedia
8		Playing mobile games

Achievement goals and achievement.

The achievement goal was measured using five items that asked about achievement goals, their perceived value, and the efforts made to achieve them (Table 3). These items were adapted from the Meaning in Life Questionnaire developed by Steger et al. (2006). Student academic achievement was computed by summing the standardized student scores from the Math, English, and Korean tests that had been administered for the panel study.

Statistical methods

A latent profile analysis (LPA) person-centered classification approach was employed to identify the smartphone usage pattern subpopulations. LPA is a statistical method that estimates the number of potential homogeneous classes in heterogeneous samples by identifying observed response patterns (Vermunt & Magidson, 2002), with the selection of the best matching model being based on multiple criteria, such as model fit indices, the nature of the groups within the model, and whether these group characteristics are related to a particular theory (Marsh et al., 2009). Of the model fit indices, Bayesian Information Criteria (BIC) and Akaike's Information Criterion (AIC) have been used to identify the statistical model data fit (Smith & Shevlin, 2008).

Because it was assumed that class members would be unbiased when considering student self-control factors in the model construction, the factors hypothesized to

Table 3 Survey items used to measure achievement goals

Number	Content	Cronbach's α
Item 1	I have a clear achievement goal	0.875
Item 2	I know what to do to achieve my goals	
Item 3	I try hard to achieve my goals	
Item 4	I believe what I am studying will help to achieve my future goals	
Item 5	I believe my achievement goal will also contribute to our society	

Table 2 Survey items used to measure respondent self-control

Self-control variables	Item	Cronbach's α
Compliance	I comply with rules even when no one watches me	0.792
Perseverance	I do not easily give up even when given difficult tasks	
Forethought	I always try to think before I start to work on things	

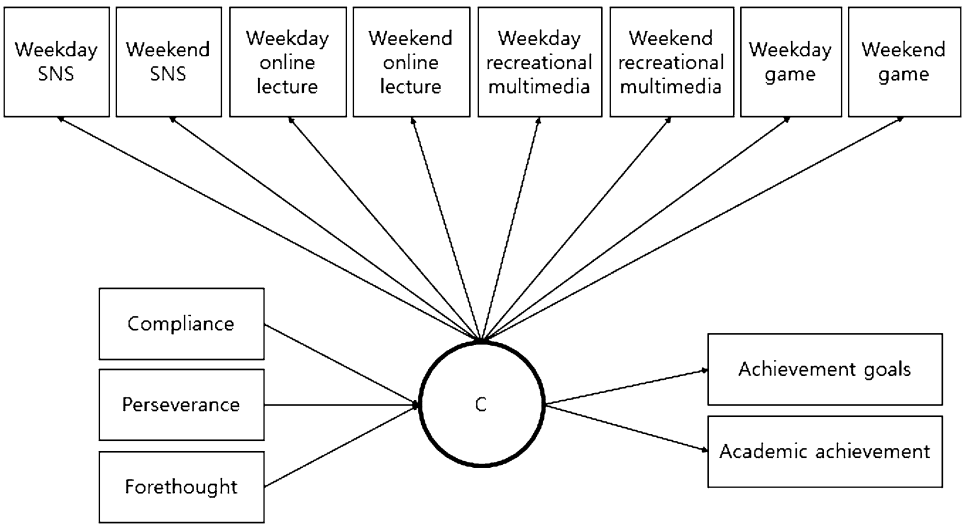

Fig. 2 Latent profile model with indicators, covariates, and outcomes

Table 4 Descriptive statistics for the covariates and outcomes

	Variable	Mean (SD)	Skewedness
Covariate	Compliance	3.76 (0.83)	− 0.46
	Perseverance	3.51 (0.82)	− 0.15
	Forethought	3.67 (0.80)	− 0.23
Outcome	Achievement goals	3.732 (0.78)	− 0.43
	Academic achievement	371.97 (51.55)	− 1.64

influence smartphone usage patterns were included in the LPA. While these analyses can be conducted without those covariates, covariate inclusion is based on the research needs, the sample size, and whether first class membership needs to be obtained without these covariates (Wurpts & Geiser, 2014). The relationships between class membership and the outcome variables were examined using the analysis of variance (ANOVA), with the post-hoc analyses conducted using the Dunnett T3 tests because the equivalence of variance assumption was found to be violated (Lee & Lee, 2018). The research model illustrated in Fig. 2 reveals the hypothesized student smartphone usage patterns, self-control factors, achievement goals, and the related academic achievements.

Results

The means, standard deviations, and skewedness of the covariates and outcomes that were examined with class membership are shown in Table 4.

Number of latent classes

To examine the model fit statistics, find the best model, and determine the number of latent classes, multiple LPAs were performed with different numbers ranging from two to five (Table 5). With the decrease in the chi-squared statistics (L2), it was found that the two-class model better fit the data than the one-class model. However, the significant p value (< .001) from the Lo-Mendell-Rubin (LMR) test obtained for the two-class model suggested that the number of classes needed to be increased. The three-class model had lower AIC and BIC than the two-class model and had an insignificant LMR test p value of .06; therefore, it was concluded that increasing the number of classes would not result in significantly better model fit statistics. As the four- and five-class models resulted in classes comprising less than 3% of the sample, this was considered problematic for model interpretability (Nylund et al., 2007). Therefore, the three-class model was chosen.

Table 5 Fit statistics for selecting the number of latent classes for the respondents

N of latent classes	L^2	Npar	AIC	Adjusted BIC	LMR p value	Entropy
2	2772.50	38	75244.31	75342.39	< 0.001	0.858
3	1601.54	54	73674.77	73814.15	0.06	0.814
4	1485.09	70	72359.74	72540.41	0.58	0.855
5	1087.74	86	71255.66	71477.64	0.26	0.847

Class characteristics

The three identified classes showed variations in the time spent on the four activities on weekdays and weekends (Fig. 3). Of the 2341 respondents, 1631 (69.67%) were assigned to the first class, which was characterized by minimal smartphone use across all four activities. While the respondents in this class spent some time on social networking services and recreational multimedia, it was less than the time spent by the other two classes. Further, as this class also spent little time watching online lectures or playing mobile games, it was labeled the "minimal use group." The 449 respondents (19.18%) placed in the second class spent slightly more time on social networking services, recreational multimedia, and mobile games, but much more time using their smartphones for learning on online lectures; therefore, this class was labeled the "learning group." The 261 respondents (11.15%) classified into the third class had heavy social networking and recreational multimedia use and spent more time on mobile games than the other two classes; therefore, this class was labeled the "recreational use group".

Self-control variables as covariates

To determine whether the self-control variables predicted the probabilities of classification into the three classes, logistic regression pairwise comparisons using logistic regression odds ratios were conducted, the results for which are given in Table 6. Respondents who had higher levels of perseverance were more found to be more likely to be in the learning group than in the minimal use group ($\beta = .301$, $p = .006$), respondents who did not comply with the rules when unwatched by others (i.e., lower levels of compliance) were found to be more likely to be in the recreational use group than in the minimal use group ($\beta = -.239$, $p = .05$), respondents who gave up more easily on challenging tasks (i.e., lower levels of perseverance) were found to be more likely to be in the recreational use group than in the minimal use group ($\beta = -.529$, $p = .000$), and respondents who had lower levels of perseverance were more likely to be in

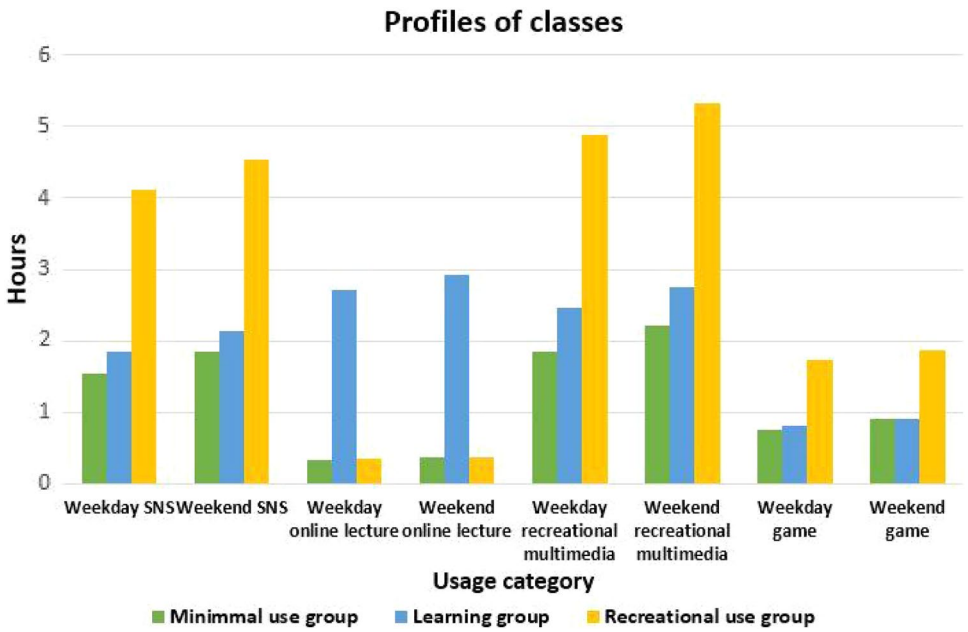

Fig. 3 Class profiles

Table 6 Logistic regression analyses using self-control variables as covariates

	Latent class pair					
	Minimal use vs Learning		Minimal use vs Recreational use		Learning vs Recreational use	
	β	SE	β	SE	β	SE
Compliance	− 0.001	0.097	− 0.239*	0.122	− 0.238	0.14
Perseverance	0.301**	0.109	− 0.529***	0.122	− 0.829***	0.15
Forethought	− 0.016	0.102	− 0.101	0.121	− 0.085	0.14

*$p \leq 05$; **$p \leq .01$; ***$p \leq .001$

the recreational use group ($\beta = -.829$, $p = .000$) than in the learning group.

The differences between the groups in the covariates and the outcomes are shown in Table 7.

Achievement goals and academic achievement as outcome variables

Analyses of variance (ANOVA) were conducted to determine whether the achievement goals and academic achievements differed between the latent classes. It was found that there were statistically significant differences in the group means. The post-hoc analyses using the Dunnett T3 method revealed that: (1) the learning group had a significantly higher score for the achievement goals than the minimal and recreational use groups; (2) the minimal use group's achievement goal score was significantly higher than that of the recreational use group; (3) the learning and minimal use groups demonstrated significantly higher academic achievement scores than the recreational use group; and (4) there were no academic achievement score differences between the learning and minimal use groups (Table 8).

Table 8 Post hoc analyses for achievement goals and academic achievement

	Mean difference	Standard. error
Achievement goals		
Learning > Minimal use	.121**	.040
Learning > Recreational use	.370***	.062
Minimal use > Recreational use	.249***	.054
Academic achievement		
Learning = Minimal use	1.544	2.733
Learning > Recreational use	26.928***	3.791
Minimal use > Recreational use	25.384***	3.248

*$p \leq 05$; ** $p \leq .01$; *** $p \leq .001$

Discussion

This study's main aim was to explore adolescent subpopulation smartphone usage patterns and the relationships between the identified class memberships, covariates, and outcomes. The identified three latent classes; the learning group, recreational group, and minimal use group; were able to be described based on prior research findings. The learning group characteristics in this study were students who used their smartphones mainly for learning, which was similar to the findings in Lai and Zheng (2018), which reported that similar to students who used their mobile devices for language learning outside class, this type of student focused on mobile learning and minimally engaged with recreational activities. Vogel et al. (2009) found that these types of students tended to have high time management skills and efficiently allocated their time for learning. Sha et al. (2012) also claimed that these students were often self-regulated learners. This study provided supporting evidence that while the students classified into the learning group spent more time on their smartphones than those in the minimal group, their learning time was noticeably greater. Perseverance was also found to contribute to the probability of being classified into the learning group versus the minimal use group, which possibly indicated that students who had higher self-control skills would be more likely to use their smartphone devices to learn rather than merely avoiding its use.

This finding provided new insights into student guidance. Previous research on adolescent smartphone use has claimed that students with high self-control were good at suppressing their smartphone use. For example, Cha and Seo (2018) suggested that at-risk students were more likely to be addicted to their smartphones and needed to be prevented from excessive use. However, this study's findings also shed light on a group of students who had higher self-control and gravitated toward using their smart phone devices to bolster their learning. This means that smartphones need not be considered disruptive devices that should always be suppressed for adolescents, and highlighted that it is more important to guide students in using their devices wisely. Lai and Hwang (2014) found that students who spent sufficient time learning using their mobile devices had good communication, problem-solving, and creative skills. The positive relationship found between learning through smartphones, the achievement goals, and the academic achievement supported this observation. Due to the recent outbreak of the Covid-19 pandemic, online learning has been recognized as

Table 7 Group differences in the covariates and outcomes

	Variable	Minimal use		Learning		Recreational use	
		Mean	SD	Mean	SD	Mean	SD
Covariate	Compliance	3.50	0.94	3.64	0.93	3.40	0.98
	Perseverance	3.54	0.80	3.69	0.77	3.06	0.89
	Forethought	3.69	0.78	3.77	0.79	3.39	0.88
Outcome	Achievement goals	3.72	0.77	3.89	0.75	3.55	0.80
	Academic achievement	373.14	52.00	379.46	50.22	352.78	46.98

a promising alternative to conventional face-to-face classes. (Dhawan, 2020). In the face of this new normal, it is therefore necessary to pay greater attention to the potential of mobile devices as flexible learning alternatives. Because the mobile learning market is rapidly growing, students can now benefit from various mobile learning resources, such as micro content (Yin et al., 2021).

However, the characteristics of the students who were classified into the recreational group were similar to previous studies that found these types of students more vulnerable to smartphone addiction (Dmoura et al., 2020). Students who have an addiction to their smartphones have been found to be spontaneous users, rarely plan the amount of time they spend online (Gökçearslan et al., 2016), spend excessive time on their smartphones every day, and feel anxious when they do not have access to them (Samaha & Hawi, 2016). This study's findings were consistent with these past results as the students classified into the recreational group spent about two to three times more time than the other two groups on recreational activities on both weekdays and weekends. The respondents who quickly gave up on challenging tasks were also more likely to be classified in the recreational group than the learning or minimal use group, and were also less likely to comply with the rules when no one was watching them than the minimal group. These findings indicated that poor self-control was associated with recreational smartphone use, lower goal achievement levels, and poorer academic achievement.

This finding was consistent with Park et al. (2014), which found that smartphone addiction was negatively associated with the ability to maintain focus on promotion as promotion-focused people endeavor to create a better state than now. In the current study, the recreational group's low achievement goal scores may have been because of their complacent attitudes. As adolescence is a time when students need to focus on their future goals, they need guidance to avoid a reckless use of their smartphones. Research has suggested several methods to encourage self-control to engender desirable self-regulated learning on mobile devices. For example, Yun et al. (2017) proposed a mobile learning agent system that used behavior tracking technologies to assist students to focus on mobile learning recent data analytics methods also have the potential to support self-regulated student learning. Tabuenca et al. (2015) examined the effects of an analytics system that leveraged student input into their smartphones about their learning activity plans, and found that the system improved self-regulated learning skills, such as time management.

The characteristics of the students classified into the minimal use group have been identified as "self-controlled students" in prior studies (Gökçearslan et al., 2016). For example, Gökçearslan et al. (2016) suggested that students with self-control were good at staying away from their devices when necessary However, the findings in this study appeared to indicate that the self-control ability was a multi-layered concept. As suggested in Gay et al. (2011), the minimal use and learning group students may have different types of self-control skills. To be specific, it could be inferred that the minimal use group merely used passive self-control strategies to suppress their desire to use their phones. However, this type of passive attitude did not result in the productive use of their smartphones demonstrated by the learning group students, who benefited from their mobile learning. This difference could also be because of the growth mindset concept (Park et al., 2014) as the students with higher perseverance were more likely to be classified into the learning group. Perseverance represents the ability to deal with challenges, whereas passive self-control is merely associated with suppressing an unwelcome desire. Therefore, the minimal use group students chose to avoid using their smartphones so they would not become immersed in them; therefore, the minimal use group students could be seen to be similar to the "medium level academic stressed group, non-immersed in smartphones" identified in Lee et al. (2020), as the minimal use group did not differ in academic achievement from the learning group, that is, they cared about their academic performances. Nevertheless, their achievement goals were found to be lower than that of the learning group, which indicated that the use of the smartphone for educational use may increase the chances to explore achievement goals and engage in forward-thinking.

Limitations and future research

The limitations to be addressed in future research are as follows. First, future research should explore the student smartphone experiences using qualitative data obtained from observations and interviews. While student subpopulations and the psychological factors associated with these were examined, it is crucial to understand the adolescent needs in each different group and the measures needed to provide personalized guidance. Second, it was not possible to control the external factors that might have affected the respondents' smartphone usage patterns due to the limited variables in the secondary data set. For example, parenting styles might have influenced the respondents' smartphone learning as indicated in Alhadabi et al. (2019). Similarly, school policies or classroom environments may have affected the amount of time the respondents spent on their smartphones. Future research would benefit from a multilevel modeling approach that employs more covariates and explores the effects of these variables on different levels.

Conclusion

The findings of this study contribute to research and practice as follows. First, it is anticipated that parents and educators could use these findings to develop appropriate guidelines to support students with different smartphone usage patterns. This study revealed that smartphone usage time was not necessarily associated with problematic behaviors, as evidenced by the students in the learning group who used their smartphones for primarily academic purposes that positively influenced their achievement goals and academic achievement. Therefore, rather than viewing the smartphone as disruptive, for students who academically benefit from using their smartphones, it may be appropriate to encourage them to learn using mobile educational applications. However, attention should be paid to students in the recreational group to prevent them from losing control and spending excessive time on their devices. Second, perseverance and self-control may be important factors in determining whether students know how to wisely use their smartphone, which tends to indicate that students can be differentiated based on their self-control capacities when seeking to offer guidance (Yang, 2005). For example, if a student is determined to maintain good self-control, mobile learning can be considered an instructional teaching method. Likewise, if students have poor self-control skills, teachers may first want to alert them to the abusive use of smartphones. Educators and parents are in the position to observe young students and determine whether they are ready to use their smartphones wisely. All of this highlights the importance of communicating with students about their ability to control their smartphone use and providing guidance aligned with their self-control skills. Therefore, the findings of this study can assist both researchers and educators.

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