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To cite this article:

Coskun, E. (2025). An investigation of the relationship between academic self-efficacy, achievement motivation, and smartphone addiction. *International Journal on Studies in Education (IJonSE)*, 7(4), 959-977. <https://doi.org/10.46328/ijonse.5662>

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Article Info

Article History

Received:

22 April 2025

Accepted:

20 April 2025

Keywords

Smartphone addiction

Academic self-efficacy

Achievement motivation

Middle school

Student success

Abstract

The primary objective of this study was to examine the relationships among academic self-efficacy, achievement motivation, and smartphone addiction in middle school students in Turkey. The research employed a quantitative survey model. The study's population consisted of students in the sixth, seventh, and eighth grades of middle school. The sample was comprised of 310 middle school students (166 female, 144 male) from a province in the Mediterranean region. Data were collected using the "Academic Self-Efficacy Scale for Children," the "Achievement Motivation Scale," and the "Smartphone Addiction Scale." The data analysis utilized the t Test, F Test, and Pearson Correlation Test. The findings indicate that students, despite having high self-efficacy perceptions, demonstrated a moderate level of achievement motivation and a high-moderate level of smartphone addiction. Female students scored higher than male students in both academic self-efficacy and motivation, while no significant gender difference was found in smartphone addiction. A strong positive correlation was observed between self-efficacy and achievement motivation, while both variables showed a negative correlation with smartphone addiction. In this context, it is recommended that teachers integrate digital hygiene strategies into their lesson plans, school counseling services organize programs to develop self-regulation skills, and families set limits on technology use in their children's learning environments. Future research should include students from different socioeconomic backgrounds, delve deeper into contextual variables, and utilize longitudinal designs for a more comprehensive understanding.

Introduction

The rapid development of digital technologies has transformed learning processes and significantly impacted students' academic lives (Cakir et al., 2019). This digital transformation in education has blurred the lines between in-class and out-of-class learning, making educational environments more flexible (Demir, 2024; Ozturk & Ozturk, 2022, 2024; Sui et al., 2024). While this transformation increases students' speed of access to information, it also brings risks such as distraction, the pressure to be constantly online, and digital addiction (Pérez-Juárez et al., 2023). The widespread use of smartphones facilitates non-academic interactions but can have negative consequences on academic performance (Adanir & Muhametjanova, 2024; Giunchiglia et al., 2018; Kaysi et al.,

2021). Specifically, design elements like intermittent reinforcement, infinite scrolling, and notification mechanisms, which keep users constantly engaged, negatively affect attention spans and reduce learning efficiency (Chen et al., 2023; Shon et al., 2019; Wang et al., 2023).

Middle school students are at the beginning of adolescence, a period of rapid cognitive development and a marked increase in abstract thinking skills. Piaget's theory of cognitive development emphasizes that during adolescence, students enter the stage of formal operational thought, gaining abilities such as forming hypotheses, evaluating possibilities, and making logical inferences (Chiu, 2014). This cognitive development provides a critical foundation for the development of academic self-efficacy and enables students to act more independently in their learning processes (Cheng et al., 2021). However, this increased cognitive capacity also makes them more susceptible to distractions, and intense engagement with digital tools can weaken sustained attention skills (Chen et al., 2023).

The concept of academic self-efficacy reflects students' beliefs in their ability to manage their own learning processes, succeed in academic tasks, and cope with challenges (Chen et al., 2021). Students with a high sense of self-efficacy exert more effort to achieve academic goals, are more resilient in the face of obstacles, and maintain their motivation for longer periods (Troll et al., 2021). Smartphone addiction emerges as a critical problem in this context, negatively affecting students' perceptions of self-efficacy (Chen et al., 2023). Social media applications, in particular, lead to constant social comparison, causing students to stray from their academic goals (Wu-Ouyang, 2022).

Achievement motivation, which refers to the intrinsic and extrinsic drive individuals feel to reach their learning goals, has long been recognized for its crucial role in academic performance (Badawi & Gezgin, 2020). Achievement-oriented students tend to develop more sustainable learning strategies, invest more effort to reach their goals, and show greater patience when facing difficulties (Essuman et al., 2025; Irmak, 2025; Meng et al., 2025). However, smartphone addiction interrupts these motivational processes and leads to procrastination (Zhao et al., 2025).

Kuang-Tsan and Fu-Yuan (2017) emphasize that smartphone addiction reduces life satisfaction, increases stress levels, and negatively impacts students' academic motivation. These findings suggest that the positive relationship between self-efficacy and achievement motivation can be disrupted by smartphone addiction (Kokoç & Göktaş, 2025). Consequently, the question of how academic self-efficacy and achievement motivation can be protected against digital addictions stands out as a fundamental issue for contemporary educational research.

The literature shows that digital transformation brings both significant opportunities and serious risks (Akarsu & Atbaşı, 2024; Wu-Ouyang, 2022). Therefore, the multidimensional effects of digital transformation on student success, academic self-efficacy, and motivation need to be thoroughly investigated. Within this scope, the present study aims to examine the relationships among academic self-efficacy, achievement motivation, and smartphone addiction in middle school students in Turkey.

Theoretical Framework

Smartphone Addiction and Academic Achievement in Students

In recent years, smartphone addiction among students has become a major and increasingly discussed issue. It's conceptualized as a behavioral addiction pattern defined by a loss of control, an increase in usage disproportionate to its reinforcing effects, and continued use despite negative consequences (Zhao et al., 2024). This addiction is sustained by both the social approval process, which operates on reward uncertainty, and persuasive design principles. These designs use techniques like notifications and intermittent reinforcement to maximize attention capture, which can lead to a weakening of cognitive sustainability (Chen et al., 2023).

The "silent cognitive leakage" effect, where mobile social media consumption interferes with concentration and reduces mental presence, is not just related to screen time but also to the device's physical proximity and perceived accessibility (Akdeniz, 2022). Research shows that smartphone use significantly impacts students' academic achievement, attention processes, and learning motivation (Alanoglu & Karabatak, 2021; Cantekin & Ozen, 2024; Kabakoğlu & Kuşcu Şahin, 2025; Serdar et al., 2022). A qualitative study noted that factors triggering smartphone addiction have negative repercussions on in-class learning processes (Fute et al., 2025). This leads to distraction during class, a decrease in learning efficiency, and a superficial engagement with academic tasks. Thus, smartphone addiction is a multifaceted problem that affects not only individuals but also the quality of institutional education. This has opened a debate on issues like in-class rules and the active use of devices in the learning process (Giunchiglia et al., 2018). As a result, school-based interventions are being implemented to prevent addiction. These interventions are recommended to be multi-component, integrating instruction on self-regulation, education on notification architecture, task design, and feedback loops, rather than relying on one-dimensional restrictions (Goraya et al., 2025; Eisanazar et al., 2021; Fatikasari et al., 2025; Zimmerman, 2000).

The quality of smartphone use is also crucial for academic performance (Okyar, 2024). It has been found that students who use their phones extensively for social media tend to experience a decline in academic success. This finding suggests that when students use technology primarily for entertainment and social interaction rather than for learning and research, it weakens their learning processes. Indeed, this negative relationship between smartphone addiction and academic performance, combined with weakened time management and self-regulation skills, leads to significant losses in learning (Giunchiglia et al., 2018). It is also emphasized that individual factors like cyberloafing play a significant role in smartphone addiction. According to Gökçearsan et al., uncontrolled mobile use behaviors lead students to disengage from academic tasks and use technology more as a distraction. In this context, addiction is not only linked to the widespread availability of technological tools but also to individuals' psychosocial and cognitive characteristics.

From a psychological health perspective, smartphone use is directly linked to depression, anxiety, and sleep quality. A study on university students found that as the severity of smartphone use increased, sleep disorders and psychological problems also rose in parallel (Demirci et al., 2015). This indicates that addiction harms not just academic success but also students' overall quality of life. Therefore, smartphone addiction should be addressed as a multifaceted problem that threatens both students' academic and psychosocial well-being. Recent studies

consistently highlight the negative relationship between smartphone addiction and students' academic outcomes (Chen et al., 2023; Li et al., 2024; Sui et al., 2024).

Academic Self-Efficacy and Smartphone Addiction

Academic self-efficacy is a multifaceted belief system that cognitively, emotionally, and behaviorally regulates a person's subjective judgment about successfully performing a specific academic task (Jang et al., 2021; Khazaei et al., 2024; Sünbül et al., 2003). It acts as a core motivator, activating mechanisms like goal setting, sustained effort, post-failure recovery, and strategic self-regulation. In the contemporary learning ecosystem, where students are constantly exposed to notification streams, multi-platform transitions, and persuasive design, it's argued that self-efficacy beliefs have become more fragile yet also more crucial for protecting attention resources and maintaining purposeful persistence (Chen et al., 2023; Kong et al., 2025).

Studies report that students with high self-efficacy better manage deep processing and error-monitoring processes even under increased cognitive load. Conversely, students with low self-efficacy tend to procrastinate, avoid tasks, and are overly sensitive to self-threats. This highlights that self-efficacy is not just a belief but a dynamic mechanism integrated into behavioral architecture (Li, 2023; Özaltın, 2024). Positive perceptions of technology-enriched learning environments, when combined with self-regulation strategies, reinforce self-efficacy and increase both in-class and online participation. However, when attention-grabbing interfaces weaken this process, the link from self-efficacy to performance becomes problematic (Chen et al., 2023; Rad et al., 2025; Su et al., 2025).

Research on adolescents and young adults has found an inverse relationship between self-efficacy and problematic smartphone use. Contextual variables like parental monitoring and school climate are reported to significantly moderate the strength of this relationship (Cheng et al., 2021; Sun et al., 2022). Findings that mobile social media consumption disrupts concentration and indirectly weakens academic performance suggest that the self-efficacy-to-behavior process can be interrupted (Giunchiglia et al., 2018). Therefore, self-efficacy-focused school-based interventions should include not only cognitive strategy instruction but also behavioral components like notification management, task design, and goal-oriented feedback loops to reduce the friction in converting belief into performance (Schunk & DiBenedetto, 2016; Zimmerman, 2000).

Examining self-efficacy through motivation theories—particularly the expectancy-value, self-determination, and control-value frameworks—provides a powerful lens for understanding purposeful persistence and emotional regulation simultaneously, which is especially valuable in the middle school context (Deci & Ryan, 2000; Eccles & Wigfield, 2002; Pekrun, 2006). High-self-efficacy students tend to code the value of a task more meaningfully, fulfill their needs for autonomy and competence more functionally, and exhibit more balanced emotional responses (Deci & Ryan, 2000; Pekrun, 2006; Schunk & DiBenedetto, 2016). In contrast, problematic smartphone use can weaken the behavioral manifestation of self-efficacy through its effects on sleep quality, mood, and anxiety, leading to secondary negative impacts on performance (Demirci et al., 2015; Panova & Carbonell, 2018).

Achievement Motivation and Smartphone Addiction

Achievement motivation is a persistent tendency to strive toward achieving standards of success. In the frameworks of expectancy-value, achievement drive, and self-determination theory, this motivation connects cognitive evaluations with emotional regulation (Deci & Ryan, 2000; Eccles & Wigfield, 2002). Consequently, highly motivated students structure their expectations for success in a realistic but ambitious way and activate their self-efficacy to maintain strategic self-regulation. However, when digital distractions and notification-based interruptions increase, the continuity of motivation can be fractured, triggering procrastination and avoidance behaviors (Giunchiglia et al., 2018; Ward et al., 2017; Zhou et al., 2025).

The relationship between achievement motivation and academic performance is strengthened by mediating/moderating mechanisms like control-value processes, self-efficacy, and self-control (Eccles & Wigfield, 2002; Pekrun, 2006; Zimmerman, 2000). Findings that mobile social media use disrupts sustained attention and lowers grades reveal the fragility of the motivation-performance link in the face of digital interruptions. However, they also show that this negative effect can be mitigated with appropriate pedagogical design and feedback (Giunchiglia et al., 2018; Sui et al., 2024).

Gaps in the Literature and the Significance of the Study

Previous literature primarily focuses on the direct relationship between smartphone addiction and academic achievement, often neglecting the mediating effects of variables like self-efficacy and motivation (Demirci et al., 2015; Iftikhar et al., 2022; Zhang & Zeng, 2024; Tülübaş et al., 2023; Yurt, 2025). Furthermore, studies conducted on middle school students are quite limited, with most research concentrating on university students (Koğar et al., 2025; Kuang-Tsan & Fu-Yuan, 2017; Meng et al., 2024). This indicates a need for deeper investigation into the relationships among self-efficacy, motivation, and addiction in adolescents, a critical developmental period. Most existing studies rely on cross-sectional designs, which allow for only limited causal inferences (Gökçearsan et al., 2016).

Within the framework of Bandura's (1997) social cognitive theory, there is a need for more comprehensive models on how self-efficacy interacts with motivational processes. The question of how the relationship between self-regulation and self-efficacy has transformed with the recent increase in digital distractions remains insufficiently explored in the literature (Chen et al., 2023). This study addresses these gaps by providing a new, holistic model that examines the relationships among self-efficacy, achievement motivation, and smartphone addiction. It conducts a multi-dimensional analysis that considers not only the relationship of self-efficacy with academic achievement but also the processes mediated by smartphone addiction. This approach can contribute to a more realistic understanding of students' academic experiences in the digital age.

From an applied perspective, the findings offer significant implications for educators, school administrators, and policymakers. For example, understanding the negative effects of smartphone addiction on self-efficacy can help in developing technology use policies for students (Kokoç & Göktaş, 2025). Furthermore, interventions aimed at

strengthening self-efficacy can be used as an effective tool in combating digital addiction (Hamed et al., 2023). Supporting educational programs with strategies that boost motivation can positively influence students' academic performance (Kutluay & Karaca, 2025; Sun et al., 2022; Wu et al., 2024).

This study highlights the necessity of holistic approaches that consider students' cognitive, social, and motivational characteristics in the digital age. With this in mind, the study aims to investigate the relationships among academic self-efficacy, achievement motivation, and smartphone addiction in middle school students in Turkey. In line with this aim, the following research questions were addressed:

- 1- What are the levels of academic self-efficacy, achievement motivation, and smartphone addiction in middle school students?
- 2- Do academic self-efficacy, achievement motivation, and smartphone addiction in middle school students differ significantly by gender?
- 3- Do academic self-efficacy, achievement motivation, and smartphone addiction in middle school students differ significantly by grade level?
- 4- Is there a significant relationship among academic self-efficacy, achievement motivation, and smartphone addiction in middle school students?

Method

Research Model

This study employed a survey model because its goal was to determine the levels of academic self-efficacy, achievement motivation, and smartphone addiction among middle school students and examine these variables in relation to various factors. A survey model is a research approach that aims to describe a situation as it exists or existed in the past. In this model, the researcher observes events, individuals, objects, or phenomena in their natural environment without any intervention. The primary objective of the survey model is to present a detailed account of the situation and describe its existing characteristics. Therefore, this model is frequently used to examine relationships between variables, identify trends, and gain a more systematic understanding of a current situation (Creswell, 2002).

Population and Sample

The study's population consists of middle school students in the sixth, seventh, and eighth grades. A private school in the province of Mersin that facilitated the research was chosen as the sample. Teachers and families were informed about the study beforehand, and students who volunteered were included in the research process. Using the formula $n = d^2 \times (N-1) / t^2 \times p \times q$ (Singh & Masuku, 2014) and assuming a significance level of .05, the required sample size was calculated to be 290. This study used a convenience sampling method, and the research scales were administered to 310 students. Convenience sampling is a non-random sampling method in which the sample to be selected from the population is determined by the researcher's judgment. In convenience sampling, data is collected from the population in the easiest, fastest, and most economical way (Etikan et al., 2007; Golzar et al., 2022). Of these students, 166 (53.54%) were female, and 144 (46.46%) were male. The

distribution of participants by grade level was as follows: 112 were in the sixth grade, 108 were in the seventh grade, and 90 were in the eighth grade. The willingness of the participating middle school students and the school administration to volunteer for the study positively affected the quality of the research and the reliability of the scales.

Data Collection Instruments

In this study, the "*Academic Self-Efficacy Subscale of the Self-Efficacy Scale for Children*," the "*Achievement Motivation Scale*," and the "*Smartphone Addiction Scale*" were used as data collection instruments.

The Self-Efficacy Scale

The Self-Efficacy Scale for Children was developed by Muris (2001) to measure the social, academic, and emotional self-efficacy of adolescents aged 12–19. The Turkish adaptation of the scale was conducted by Telef and Karaca (2012). The scale has a three-factor structure: academic self-efficacy, social self-efficacy, and emotional self-efficacy, and it consists of a total of 21 items. An examination of the scale's internal consistency coefficients showed a Cronbach's alpha of .86 for the overall scale, while the subscales had coefficients of .84 for academic self-efficacy, .64 for social self-efficacy, and .78 for emotional self-efficacy. For the purposes of this study, the 7-item Academic Self-Efficacy subscale of the Self-Efficacy Scale for Children was used.

Achievement-Oriented Motivation Scale

The Achievement-Oriented Motivation Scale was developed by Semerci (2010) to determine students' achievement-oriented motivation. It is a 5-point Likert-type scale consisting of 35 items (1=strongly disagree, 5=strongly agree). Higher scores on the scale indicate an increase in achievement-oriented motivation. In Semerci's original study, the Cronbach's alpha coefficient for the scale was 0.89, while in this study, it was found to be 0.75. The survey form was created using Google Forms and participants were invited to complete the survey online through WhatsApp groups. The purpose of the research, its voluntary nature, and the commitment that all information would be used for scientific purposes only were all stated in the introductory section of the online form. Only students who read and approved this explanation were able to proceed to the research questions.

Smartphone Addiction Scale

For the purposes of this research, a Likert-form measuring instrument developed by Kwon et al. (2013) and adapted into Turkish by Noyan et al. (2015) was used to measure smartphone addiction in middle school students. The scale has a one-dimensional, 10-item structure. An exploratory factor analysis conducted on this study's sample also demonstrated that the scale has a one-dimensional structure and a high level of validity. Furthermore, the Cronbach's Alpha coefficient for the middle school sample was calculated to be .89. This finding indicates that the scale has high reliability for measuring smartphone addiction among middle school students.

Data Analysis

The normality of the score distribution was examined using the Kolmogorov-Smirnov (K-S) Test. Based on the test results ($p < .05$), the assumption of normal distribution was met. Therefore, to determine if there were significant differences in middle school students' academic self-efficacy, achievement motivation, and smartphone addiction based on gender, grade level, and parental education status, t Test and F Test were used (Yurt, 2023). The relationships among academic self-efficacy, achievement motivation, and smartphone addiction were investigated using the Pearson correlation coefficient.

Findings

Descriptive findings regarding middle school students' academic self-efficacy, achievement motivation, and smartphone addiction are presented in Table 1.

Table 1. Descriptive Analysis of Middle School Students' Academic Self-Efficacy, Achievement Motivation, and Smartphone Addiction

	N	Minimum	Maximum	Mean	<i>Sd</i>
Academic Self-Efficacy Total	310	2.04	5.00	3.58	0.56
Achievement Motivation Total	310	1.86	5.00	3.21	0.67
Smartphone Addiction Total	310	1.00	5.00	3.41	1.00

Upon examining Table 1, it was determined that the middle school students who participated in the study had high levels of academic self-efficacy ($M=3.58;SD=0.56$), a moderate level of achievement motivation ($M=3.21;SD=0.67$), and an upper-moderate level of smartphone addiction ($M=3.41;SD=1.00$).

Table 2. Comparison of Middle School Students' Academic Self-Efficacy, Achievement Motivation, and Smartphone Addiction by Gender

	Gender	N	Mean	Std. Deviation	t	p
Academic Self-Efficacy Total	Female	166	3.65	0.53	2.184	0.030*
	Male	144	3.51	0.58		
Achievement Motivation Total	Female	166	3.28	0.71	1.984	0.048*
	Male	144	3.13	0.60		
Smartphone Addiction Total	Female	166	3.34	1.00	-1.463	0.145
	Male	144	3.50	0.99		

* $p < 0.05$

Table 2 shows the comparison of middle school students' academic self-efficacy, achievement motivation, and smartphone addiction scores by gender. According to the Independent Samples t-test analysis, the scores on the smartphone addiction scale did not show a significant difference based on gender ($p > 0.05$). It was found that both genders had upper-moderate levels of smartphone addiction at the middle school level. However, the scores on

the academic self-efficacy and achievement motivation scales showed a significant difference by gender ($p < 0.05$). Based on the group averages, female students were found to have a higher perception of academic self-efficacy and higher achievement motivation compared to their male peers.

Table 3. Comparison of Middle School Students' Academic Self-Efficacy, Achievement Motivation, and Smartphone Addiction by Grade Level

	Grade	N	Mean	Std. Deviation	F	p
Academic Self-Efficacy Total	6	112	3.53	0.56	7.165	0.001**
	7	108	3.49	0.52		
	8	90	3.77	0.57		
Achievement Motivation Total	6	112	3.05	0.55	8.365	0.000**
	7	108	3.19	0.62		
	8	90	3.43	0.79		
Smartphone Addiction Total	6	112	3.49	0.87	4.819	0.009**
	7	108	3.56	1.02		
	8	90	3.15	1.08		

** $p < 0.01$

In Table 3, middle school students' scores on the academic self-efficacy, achievement motivation, and smartphone addiction scales were compared by grade level. According to the One-Way ANOVA F-test analyses, the scores on all three scales showed a significant difference by grade level ($p < 0.05$). Scheffé post-hoc tests revealed that for both academic self-efficacy and achievement motivation, eighth-grade students had higher average scores compared to sixth and seventh-grade students. Conversely, for smartphone addiction, sixth and seventh-grade students had higher average scores than eighth-graders.

Table 4. The Relationships Among Academic Self-Efficacy, Achievement Motivation, and Smartphone Addiction in Middle School Students

		Academic Self-Efficacy	Achievement Motivation	Achievement Motivation
Academic Self-Efficacy	r	1	.457**	-.237**
	p		0.000	0.000
	N	310	310	310
Achievement Motivation	r	.457**	1	-.151**
	p	0.000		0.008
	N	310	310	310
Achievement Motivation	r	-.237**	-.151**	1
	p	0.000	0.008	
	N	310	310	310

** . Correlation is significant at the 0.01 level (2-tailed).

As seen in Table 4, the correlations between academic self-efficacy, achievement motivation, and smartphone

addiction in middle school students ranged from -0.157 to 0.457. Upon reviewing the correlation coefficients, the following relationships were found: A positive correlation of 0.457 between academic self-efficacy and achievement motivation ($p < 0.05$). A negative correlation of -0.237 between academic self-efficacy and smartphone addiction ($p < 0.05$). A negative correlation of -0.151 between achievement motivation and smartphone addiction ($p < 0.05$). These coefficients indicate that both academic self-efficacy and achievement motivation have a significant but inverse relationship with smartphone addiction. In general, students with lower academic self-efficacy and lower achievement motivation were found to have higher levels of smartphone addiction.

Discussion

This study examined the relationship between academic self-efficacy, achievement motivation, and smartphone addiction in middle school students in Turkey. The findings reveal that middle school students have a high level of academic self-efficacy, a moderate level of achievement motivation, and an upper-moderate level of smartphone addiction. This suggests that while students feel competent in their learning processes, this self-efficacy doesn't fully translate into motivation for achievement. High self-efficacy indicates that students are more prepared to overcome obstacles in academic tasks (Schunk & DiBenedetto, 2016). However, the moderate level of achievement motivation points to certain limitations in their intrinsic and extrinsic drive toward learning goals (Eccles & Wigfield, 2002). The upper-moderate level of smartphone addiction suggests that digital technologies might be negatively affecting students' attention and learning processes (Giunchiglia et al., 2018).

The findings also show that students' learning outcomes cannot be fully understood without considering self-efficacy and motivation together. The literature notes that students with strong self-efficacy can cope more effectively with digital distractions and are more determined to focus on their learning goals (Troll et al., 2021). However, the high level of smartphone addiction indicates that students' self-efficacy and motivational resources are being eroded (Demirci et al., 2022). Compared to prior work, such as that by Boumosleh and Jaalouk (2017), which found smartphone addiction negatively affects academic achievement in university students, this study identifies a similar pattern among middle school students. A key contribution of this research is showing that even with relatively strong self-efficacy, adolescents' motivational processes are hindered by addiction. Thus, these findings highlight the potential for digital addictions to weaken academic motivation at the middle school level, underscoring the importance of educational interventions (Kokoç & Göktaş, 2025; Meng et al., 2025).

The second set of findings reveals that female students have higher academic self-efficacy and achievement motivation than male students, but there is no significant gender difference in smartphone addiction levels. This indicates that female students feel more competent and are more motivated to learn. Gender-based differences in learning attitudes and motivational resources are known to emerge during adolescence (Labrague, 2024). The advantage in self-efficacy and motivation among female students is seen as a factor that strengthens their academic performance (Eccles & Wigfield, 2002). Conversely, the lack of a gender difference in smartphone addiction suggests that both genders are similarly affected by digital addiction risks (Samaha & Hawi, 2016). While some studies in the literature suggest male students have higher addiction levels (Chiu, 2014; Cheng et al., 2021), this study's findings point to a diminishing gender gap in the context of addiction, suggesting that addictive digital

elements are becoming more homogenized across genders (Kurt et al., 2024). Therefore, while motivational support should be tailored to reinforce the academic advantages of female students, joint policy and guidance practices for both genders are necessary to address digital addiction.

The study also found that students' academic self-efficacy and achievement motivation differ by grade level, with eighth-grade students showing higher levels of both. In contrast, sixth and seventh-grade students showed a higher tendency toward smartphone addiction. These findings suggest that cognitive and motivational development processes in adolescence differ in parallel with grade level. The stronger academic self-efficacy and motivation of eighth-grade students can be linked not only to cognitive developmental progress but also to the increased sense of responsibility and goal-orientation associated with preparing for the LGS exam (a high-stakes national exam in Turkey) (Karanfil, 2020; Yıldırım & İnan, 2024). The exam preparation process is believed to reinforce students' self-regulation skills and increase their focus on learning goals (Kurt & Koçak, 2025; Schunk & DiBenedetto, 2016). This indicates that the heightened academic anxiety and sense of responsibility in adolescence strengthen motivational processes (Kul, 2024).

The higher smartphone addiction levels among sixth and seventh graders suggest that digital device use increases during periods with less exam pressure (Erümit & Şahin, 2025). These findings align with research that highlights more pronounced digital addiction tendencies in early adolescence, which tend to decrease later due to exam pressure (Aydogdu et al., 2024; Kuang-Tsan & Fu-Yuan, 2017). The higher levels of academic self-efficacy and motivation in eighth-graders can also be explained by their tendency to develop strategic goals for exam success (Özyeter & Kutlu, 2024). Some studies have shown that the exam preparation process both boosts motivation and reinforces self-regulation in students (Deveci, 2024; Karanfil, 2020). Correspondingly, some studies emphasize that exam anxiety reduces smartphone addiction because students use their time more strategically (Yıldırım & İnan, 2024). The lower addiction levels found in eighth-graders in this study also suggest that the exam preparation process enhances their ability to cope with digital distractions. Therefore, grade-level differences are explained not only by cognitive development but also by exam-based contextual factors, indicating that educational interventions should be developmentally sensitive and consider the exam preparation process.

The study's findings also show a strong positive relationship between academic self-efficacy and achievement motivation, while both variables have an inverse relationship with smartphone addiction. This suggests that students with high self-efficacy are more determined to pursue their learning goals and maintain their motivation for longer, whereas students with low self-efficacy are more vulnerable in academic tasks due to their addiction tendencies (Bandura, 1997; Hamed et al., 2023). The simultaneous increase in self-efficacy and motivation contributes to academic success, while smartphone addiction weakens these two variables, interrupting learning processes with digital distractions (Demirci et al., 2015; Wu-Ouyang, 2022). This pattern aligns with the explanatory power of social cognitive theory regarding self-regulation and goal-orientation processes (Schunk & DiBenedetto, 2016).

Similarly, the literature notes that the positive relationship between self-efficacy and motivation is weakened by digital addiction, leading to shorter attention spans and increased procrastination (Iftikhar et al., 2022; Zhao et al.,

2024). Comparing the findings of this study with those conducted on university students, it is evident that a similar tripartite relationship exists at the middle school level (Boumosleh & Jaalouk, 2017; Jeong, 2025; Meng et al., 2025; Sun et al., 2022). When motivation is positively reinforced by self-efficacy, students can cope with addiction more effectively, which strengthens learning outcomes (Li et al., 2024). Conversely, as smartphone addiction increases, the weakening of self-efficacy and motivational resources triggers academic anxiety and procrastination (Zhang & Zeng, 2024). The findings are largely consistent with the "digital addiction – low self-efficacy – low motivation cycle" highlighted in the literature (Kokoç & Gökteş, 2025; Koğar et al., 2025; Zhao et al., 2025). However, in the context of middle school students, this relationship must also be considered in light of contextual factors like exam preparation, peer pressure, and family expectations. The results of this research show that school-based interventions aimed at increasing self-efficacy and motivation should be supported by strategies that also reduce digital addiction. In this regard, programs that develop students' self-regulation skills and teach digital attention management are considered effective strategies for breaking the negative cycle of this tripartite relationship (Kutluay & Karaca, 2025; Wu et al., 2024).

This study supports the idea that students' self-efficacy and achievement motivation have a decisive impact on academic performance, as predicted by social cognitive theory (Schunk & DiBenedetto, 2016). The findings also validate the basic assumptions of expectancy-value theory, as students' motivation for success is shaped in conjunction with their self-efficacy perceptions (Eccles & Wigfield, 2002). Furthermore, the results support the control-value theory, as academic tasks that students value under exam pressure, combined with their self-efficacy perceptions, create a strong motivation for success (Pekrun, 2006). Within the framework of self-determination theory, it is clear that students' intrinsic motivation is negatively affected by external obstacles like digital addiction (Deci & Ryan, 2000). This shows that motivational processes in the digital age are influenced by multidimensional factors.

Conclusions and Implications

This study has filled a significant gap in the literature by examining the relationships among academic self-efficacy, achievement motivation, and smartphone addiction in middle school students in Turkey. Our findings demonstrate how students' motivational and self-regulation processes can be interrupted by digital addiction and how contextual factors, such as preparing for high-stakes exams like the LGS, can help balance this effect. The research not only supports existing theoretical approaches but also makes a unique contribution by highlighting the regulatory role of the LGS context on motivational processes. The results offer a guiding framework for educational practices and policymakers, suggesting ways to manage a healthier learning ecosystem for students in the digital age. By generating applicable insights at both the individual and institutional levels, this research provides a lasting roadmap for future studies. In this way, the study adds long-term value to the field and serves as a fundamental reference point for understanding the relationship between digital addiction and motivational processes in education.

The findings have important practical implications for school administrators, teachers, families, and counseling services. Firstly, programs aimed at boosting students' academic self-efficacy and achievement motivation should

also include strategies for combating digital addiction. Teachers should integrate digital hygiene practices and notification management strategies into their lesson plans to help reduce student distraction. Counseling services must work to regulate smartphone use while also alleviating students' exam-related anxiety. Families can contribute to the development of self-regulation skills by setting limits on technology use in their children's learning environments. Additionally, task design and assessment processes need to be re-envisioned to strengthen both students' self-efficacy and their motivational processes. In this context, including activities that develop digital attention management skills in the curriculum is crucial.

Recommendations

The study found that students' smartphone addiction was moderate. To reduce students' smartphone addiction levels, school counselors and teachers should focus more on conscious smartphone use. To reduce smartphone addiction, learning environments should be created where participants can engage in teamwork, and collaboration should be used to enhance motivation and academic self-efficacy. Future research should conduct similar studies on students from different socioeconomic backgrounds to test the generalizability of our findings. A deeper investigation into how contextual variables like exam anxiety, family expectations, and peer influence affect self-efficacy and motivation would provide a more comprehensive understanding of students' academic development. The use of longitudinal designs in future work would offer the opportunity to track changes in students' self-efficacy, motivation, and addiction levels over time. Developing scales that are more culturally appropriate and testing new measurement tools could also improve data reliability. Future studies should also include the perspectives of teachers, parents, and peers to contribute to a multidimensional understanding of students' motivational and behavioral processes. These recommendations would help address the limitations of the current study and generate more robust conclusions.

Limitations

This research is limited by a sample confined to students at a single private school in the province of Mersin. The findings must be interpreted with caution, as the limited representativeness of the sample may reduce the generalizability of the results. Additionally, the use of self-report scales may have introduced a social desirability bias into students' responses. The online survey format for data collection could also have influenced students' motivation and attention spans. The cross-sectional design of the study limits the investigation of causal relationships between variables over the long term. Furthermore, by focusing solely on academic self-efficacy, achievement motivation, and smartphone addiction, the study excluded other factors that may influence students' academic performance. The use of culturally adapted versions of the scales may also present limitations regarding the validity and reliability of the measurement tools. Despite these limitations, this research provides valuable contributions to understanding the relationship between the academic and digital lives of middle school students.

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