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IMPACT OF SCREEN TIME ON EMOTIONAL REGULATION AND EXECUTIVE FUNCTIONING IN ADOLESCENTS

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Abstract
This study aimed to explore the impact of screen time on emotional regulation and executive functioning among adolescents, with a particular focus on the mediating role of emotional regulation. The correlational design was used to collect data from a sample of 241 adolescents, aged 11 to 18 years, across six public and private educational institutions in Lahore, Pakistan. The participants were selected using purposive sampling to ensure a representative sample for analysis. The instruments used included Screen Time-Based Sedentary Behavior Questionnaire, Adolescents' Emotion Regulation Strategies Questionnaire – Extended (AERSQ-E), and the Executive Skills Questionnaire – Revised (ESQ-R). The data was analyzed using SPSS, applying descriptive statistics, Pearson product-moment correlation, and mediation analysis through Hayes' Process Macro (Model 4). Contrary to the initial hypothesis, screen time was found to have a weak positive relationship with executive functioning. The positive reorientation, social support, has a positive relationship with executive functioning. However, Creative expression and distraction did not show significant effects. Mediation analysis revealed that rumination and aggressive outlet negatively mediated this relationship. These findings suggest that while higher screen time is often criticized, it can enhance executive functioning when associated with constructive content and adaptive emotional strategies. The study emphasized the importance of considering the quality and purpose of screen use rather than solely its duration.

INTRODUCTION

In recent years, the persistent use of digital screens among adolescents has increased, making screen-based activities such a social media, gaming, online learning and video consumption an integral part of daily routine. As, adolescence is a critical stage for emotional, social and brain development, unregulated screen use interferes with healthy cognitive development and emotional growth. This study aimed to explore whether screen usage is contributing to shifts in cognitive processes and emotional responses among adolescents.

This trend grew significantly during the COVID-19 pandemic, when remote learning and heightened screen exposure became the norm. According to Pakistan Pediatric Association, approximately 80% of children between 6–18 years spend an average of 4 - 6 hours daily on screens (Tribune, 2023). While technology offers

learning and social connection, excessive use has been linked to poor academic performance and health concerns. Research indicates that heavy exposure to screens affects memory consolidation, decreases learning efficiency and hinders information retention (Islam, 2024). Adolescents are vulnerable to these changes, as the area of the brain responsible for memory, decision-making, and emotional regulation are still maturing (Casali, 2023). Therefore, it is essential to cultivate positive emotional regulation skills to build resilience and enhance adolescents' overall well-being (Silvers, 2021).

Screen time is the amount of time a person spends interacting with televisions, computers, tablets, or smartphones. It includes a variety of activities such as watching television, playing video games, browsing the internet, using social media, and studying online. (Rey-Lopez et al., 2012). Digital reports indicate that nearly 65% of the 111 million internet users in Pakistan access social media platform daily, with YouTube, Facebook, TikTok and Snapchat continue to grow rapidly. Excessive exposure to screens impairs emotional regulation, affects language and social skills, and increases body image issues. (Yusuf, 2025). On the other hand,

People living in urban areas spend more time engaging with screens due to the availability of fast internet connectivity and social influence. Within this context, a gender difference has also emerged. Boys spend majority of their time playing video games, while girls spend their time scrolling through social networking apps. (Taywade & Khubalkar, 2019). Individuals are becoming more and more dependent on screens to deal with boredom, stress, or emotional discomfort. This leads to a dependency loop in which screens are the new way to escape emotions (Fick, 2025). Adolescents' excessive exposure to blue light at night suppresses the melatonin production, increases stress hormones, and disturbs sleep cycle (Purwaningsih & Nurmala, 2021). Lack of sleep further impair emotional stability and self-regulation.

Parental control significantly reduces exposure to excessive screen time, whereas uncontrolled exposure raises the risks of impulsivity, substance use, and poor decision making (Ding et al., 2024). Moreover, mothers' employment status also has an influence on children's screen time, as working women have less time to keep an eye on their children's daily activities (Xie et al., 2023). Furthermore, socio economic status, parental education, social pressures, peer influence, and number of digital devices also influences screen habits (Van Dyck et al., 2011).

Given these patterns, it is crucial to understand the implications of screen exposure on the developing brains of adolescents, particularly with emotional regulation and executive functioning. Emotional regulation (ER) is the process through which individuals manage and shape emotional experience and expression. ER plays a vital role in regulating negative emotions, such as anger and sadness, as well as positive emotions (Rådman et al., 2023).

Emotion regulation strategies are differentially associated with mental health problems in adolescents. Maladaptive strategies such as rumination, avoidance, suppression, and aggressive outlets were positively linked to various psychological difficulties. Conversely, adaptive strategies like positive reorientation and social support were negatively associated with these problems (Aldao et al., 2009). Another strategy, distraction, creative expression revealed little or no significant connection with mental health problems (Rådman et al., 2023). Overall, these patterns confirm that ER maladaptive strategies correlate with multiple issues while ER adaptive strategies act as protective factors during adolescence.

Executive functioning refers to a group of cognitive skills needed to manage thoughts, behaviors, and emotions that allows to plan, concentrate, remember instructions, and multitask (Nasir et al., 2021). Short videos, e.g., reels on TikTok, and Instagram, provide fragmented and fast-moving signals that unable the brain to maintain attention on longer academic and slower-paced tasks (Du et al., 2024). The switching between media and receiving multiple notifications burden the working memory and make new information harder to remember and use (Maizel, 2024). Violent and

fast-paced media (video games, movies) leads to impulsive and aggressive behavior (Hayes et al., 2025).

The continuous influx of digital overstimulate the brain's dopamine reward system. (Cristol, 2024). Screen based rewards such as browsing social media, shopping online, or viewing endless reels, results in a constant release of dopamine (Rixen et al., 2023). This pattern of lifestyle leads to a variety of psychological and physical problems, including burnout, emotional numbness, cognitive fog, artificial elevation in dopamine levels making normal activities dull and unmotivating. (Boer et al., 2020).

Due to these reasons, researchers promote digital detox behavior, which involve intentional break from electronic devices (Anandpara et al., 2024). A new study shows that a 72 hours phone detox resets brain's dopamine and serotonin systems, helping us to feel more focused, calm, and mentally sharp (Schmitgen et al., 2025). Digital detox includes journaling, mindful walking, deep breathing exercises, or spending time in nature. Additionally, Taking short breaks, physical exercises promotes emotional well-being and enhances psychological functioning (jivahealth, 2024).

Digital wellness is not about being totally deprived from the usage of technology; it is about thinking about the way we use technology. By integrating mindful screen practices, we would be able to enhance mental wellbeing (Laffier et al., 2025).

Theoretical Explanation

The present study is based on the Dual Process Theory (Bellini-Leite, 2022) that describes the influence of screen time on emotional regulation and executive functioning. DPT states that there are two systems of human thinking:

Type 1: fast, automatic, and emotion driven.

Type 2: slow deliberate, and analytical

Moreover, due to high screens consumption, people depend more on Type 1 system as digital interactions are quick, stimulating and constant. These quick, automatic reactions bypass the reflective processes necessary for emotional regulation. Effective emotional regulation requires the activation of Type 2 system, which allow individuals to pause, think and respond thoughtfully. However, when screen interactions are frequent and fast-paced, it reduces the opportunity to engage in more thoughtful thinking and shift from Type 1 to Type 2 processing.

Literature Review

Research in Pakistan shows that parent-child relationships, screen time, and psychological well-being are highly connected. Poor-quality parent-child relationships were significantly associated with increased screen time and reduced psychological well-being (Aftab et al., 2023). Further, literature suggests that screen time impacts cognitive, social-emotional, and physical growth, among children and adolescents, causing reduced attention, language development, memory, and also raised the chances of obesity, sleep, and emotional dysregulation (Goswami & Parekh, 2023). The study revealed the adverse effects of social media addiction, individuals are more susceptible to cyberbullying, disrupted sleep patterns and are physically unhealthy due to eyestrain and neck pain (Stevens, 2021).

The systematic analysis across 16 various countries, found significant negative correlations between excessive screen use, self-esteem, mental health problems, learning, memory and premature cognitive decline (Neophytou et al., 2019). Large-scale data from the U.S revealed that more than an hour of daily screen time displayed poor emotion regulation, reduced curiosity, and negative peer relationships and task performance (Twenge & Campbell, 2018).

Moreover, literature differentiate between adaptive and maladaptive emotional regulation strategies. Adaptive strategies (cognitive reappraisal, acceptance, social support) correlate with good psychosocial functioning, emotional wellbeing. On the other hand, maladaptive strategies (rumination, expressive suppression, and avoidance) correlate with emotional dysregulation, elevated anxiety, depressive symptoms, and withdrawal (Fombouchet et al., 2023). Findings from Swedish research showed the similar pattern where positive reorientation and social support relate to life satisfaction, while

rumination/negative thinking, aggressive outlet corresponds with emotional and behavioral issues (Rådman et al., (2023).

Screen content also play a key role. Violent or anti-social content increases irritability and aggression among Adolescents (Majeed, 2023). Prolonged screen time is linked to attention problems hyperactivity, and restlessness (Montagni et al., 2016). However, interactive digital experiences enhance children's creative capabilities (Jackson et al., 2011).

Research suggested that adolescents engage in both adaptive (connecting with friends, seeking support) and maladaptive (mindless scrolling) emotion regulation strategies (Davis et al., 2025). Different social media platforms demonstrate various psychological impacts. TikTok and YouTube is associated with increased anxiety, depression, and loneliness, while Snapchat use is associated with better mental health outcomes (Woodward et al., 2025).

Literature suggests the direct associations between emotional regulation and executive function. Children with better ER skills tend to show enhanced EF abilities (Nezhad & Delroba, 2024). Similarly, Adolescents with maladaptive emotion pattern experience higher stress, anxiety, and depressive symptoms, which had a detrimental effect on their executive functioning (Nezhad & Delroba, 2024).

Aim and Objective of the Study

- The aim was to examine the relationship between screen time and executive functioning in adolescents.
- The aim was to examine the relationship between emotional regulation and executive functioning in adolescents.
- The aim was to examine the mediating role of emotional regulation in the relationship between screen time and executive functioning.

Hypotheses

H1: There would be a negative relationship between screen time and executive functioning in adolescents.

H2: There would be a significant relationship between emotional regulation and executive functioning in adolescents.

- There would be a positive relationship between positive reorientation and executive functioning.
- There would be a negative relationship between rumination and executive functioning.
- There would be a positive relationship between social support and executive functioning.
- There would be a negative relationship between aggressive outlet and executive functioning
- There would be a significant relationship between distraction and executive functioning.
- There would be a significant relationship between creativity and executive functioning.

H3: The emotional regulation would mediate the relationship between screen time and executive functioning.

Method

A correlational research method was used in this study. The purposive sampling was used to select adolescents with excessive screen time, which is in accordance with the focus of the study. Academic institutions were used to approach the participants. G * power was used to determine the sample size. The inclusion criteria were adolescents aged between 11-18 years who have access to digital devices and spend more than 2 hours on screens daily.

Table 2.1
Sociodemographic Characteristics of Participants

Characteristics	M	SD	n	%
Age	14.98	1.30	_	_
Class	9.57	0.99	_	_
Monthly Income	245692.95	233691.76	_	_
Father Education	14.45	3.42	_	_
Mother Education	14.07	3.74	_	_
Father Job Timings	8.71	1.95	_	_
Mother Job Timings	2.11	3.36	_	_
Number of Digital Devices	1.69	1.32	_	_
Gender				
Male	_	_	129	53.5
Female	_	_	112	46.5
Students	_	_		
School	_	_	214	88.8
College	_	_	27	11.2
Socioeconomic Status				
Low	_	_	39	16.2
Middle	_	_	140	58.1
Upper	_	_	62	25.7
Personal Digital Devices				
Yes	_	_	197	81.7
No	_	_	44	18.3
Personal Room				
Yes	_	_	97	40.2
No	_	_	144	59.8
Co-Viewing				
Never	_	_	34	14.1
Rarely	_	_	39	16.2
Sometimes	_	_	67	27.8
Often	_	_	53	22.0
Daily	_	_	48	19.9
Usage Limit				
Yes	_	_	123	51.0
No	_	_	32	13.3
Sometime	_	_	86	35.7
Parental Concern				
Not At All	_	_	8	3.3
Slightly	_	_	33	13.7
Moderately	_	_	90	37.3
Very Often	_	_	110	45.6
Parental Screen Use				
Never	_	_	1	4
Rarely	_	_	80	33.2
Sometime	_	_	53	22.0
Often	_	_	63	26.1
Very Often	_	_	44	18.3

Note: M =Mean, SD = Standard Deviation, N = 121. n = Sample, % = Percentage.

Measures

The Screen Time-based Sedentary Behavior Questionnaire was used to measure the total screen time. It consists of 12 items that assess different types of screen time and sedentary activities. The questionnaire asked adolescents to report time spent on various sedentary activities (e.g., TV, video games, Internet use for study/non-study purposes) during both weekdays and weekends. The questionnaire used categorical response options ranging from 0 to 240 minutes for each activity (Rey-Lopez et al., 2012).

The second tool that was used to measure emotional regulation was Adolescents' Emotion Regulation Strategies Questionnaire. The scale is based on 33 items, designed to assess various emotion regulation strategies i.e., Positive reorientation, rumination, aggressive outlet, social support, creative expression and distraction. This tool uses a five-point Likert Scale and demonstrates strong internal consistency, with a Cronbach's alpha of 0.85 (Rådman et al., 2023).

The tool used to access executive functioning was named as Executive Skills Questionnaire. It is a 25-item self-report measure. The total score ranges from 0 to 75, with each item rated on a 4-point Likert scale. The reliability of ESQ-R is also very strong, with the overall Cronbach alpha of 0.91 (Strait et al., 2019).

Results

Reliability Analysis

Reliability analysis was performed to check the Cronbach's α for the three scales.

Table 3.1

Psychometric Properties for Scales and Subscales

Scales	M	SD	Range	Cronbach's α
Screen Time	10.97	3.92	0-4 (hours)	0.71
Positive Reorientation	10.19	2.74	0- 16	0.65
Rumination	9.54	2.92	0-16	0.66
Social Support	9.39	2.98	0-16	0.60
Aggressive Outlet	6.66	2.93	0-16	0.68
Creative Expression	7.00	2.87	0-16	0.60
Distraction	7.53	2.23	0-12	0.63
Executive Functioning	32.08	10.83	0-75	0.83

Note. K= total number of items in scale; M = mean; SD = standard deviation.

This table reflects moderate internal consistency among the scale items, with reliability coefficients of ≥ .60 considered sufficient (Nawi et al., 2020).

Correlation Analysis

Pearson Product-Moment Correlation analysis was performed to examine the relationship between study variables, i.e., predictor (Screen Time), Mediator (Emotional Regulation), outcome (Executive Functioning) and covariates.

Table 3.2

Pearson Product-Moment Correlation of Screen time (IV), and Executive Functioning (DV), Mediators and Covariates (N=241)

Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11
Screen Time	10.97	3.92	----										
Positive Reorientation	2.55	0.69	.07	----									
Rumination	2.39	0.73	.14*	-.04	----								
Social Support	2.35	0.75	.20**	.16*	.27***	-----							
Aggressive Outlet	1.66	0.73	.37***	-.09	.15*	.260***	----						
Creative Expression	1.75	0.72	.022	.17**	.13*	.11*	-.00	----					
Distraction	2.51	0.74	.16*	.25**	.14*	.09	-.31***	.27***	----				
Executive Functioning	6.63	2.18	.28***	.16*	-.29***	.26***	-.35***	.04	-.03	----			
Low SES	.16	.37	-.16*	.13*	.15*	.01	-.02	.18***	.11	-.17**	----		
Screen Limit (Yes)	.82	.39	.20***	-.11	-.14*	-.14*	-.11	-.12	-.13	.08	-.43***	----	

Note. M = Mean; SD = Standard Deviation. * =p<.05; **=p<.01; ***=p<.001

Pearson product-moment correlation revealed a significant weak positive relationship between screen time and executive functioning**.** The positive reorientation, social support, has a positive relationship with executive functioning, whereas aggressive outlet, rumination have a negative relationship with executive functioning. While creative expression and distraction did not show any significant results. Additionally, the covariates such as low SES showed negative relation and Screen limit showed positive relation with executive functioning.

Mediation Analysis

Mediation analysis was carried out using Hayes' Process Macro Model 4 (Hayes,2013). The analysis was carried out following the steps outlined by Hayes (2013). To begin, the predictor (screen time) must predict an outcome variable (executive functioning) via path c. Similarly, the predictor (screen time) must predict the mediator (emotion regulation) via "path a". Third, the mediator (emotion regulation) must predict the outcome variable (executive functioning) via path b.

Table 3.3

Direct Pathways Between Screen Time, Emotional Regulation, and Executive Functioning (N=241)

Predictors		M_1(PR)			M_2(R)			M_3(SS)			M_4(AO)			M_5(CE)			M_6(D)			Y(EF)			
		B	*SE*	*p*		*β*	*SE*	*p*		*β*	*SE*	*p*		*β*	*SE*	*p*		*β*	*SE*	*p*		*β*	*SE*	*p*
X(ST)	a_1	.01	.01	.32	a_2	.03	.01	.03*	a_3	.04	.01	.002**	a_4	.07	.01	<.001***	a_5	.004	.01	.74	a_6	.03	.01	.01**	C'	.09	.04	.009**
M_1(PR)		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----	b_1	.58	.19	.003**
M_2(R)		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----	b_2	-.53	.18	.004**
M_3(SS)		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----	b_3	.40	.18	.03*
M_4(AO)		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----	b_4	-.68	.20	.001***
M_5(CE)		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----	b_5	.02	.19	.91
M_6(D)		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----		------	-----	-----	b_6	.22	.19	.25
C_1(SES)	f_1	-.16	.07	.03		-.20	.07	.00		-.10	.07	.16		-.02	.07	.73		-.06	.07	.44		-.14	.08	.07	g_1	.31	.20	.13
C_2(SL)	f_2	-.03	.05	.53		.05	.05	.37		.09	.05	.07		-.02	.05	.70		-.08	.05	.15		.04	.05	.47	g_2	.34	.14	.02
Constant	iM_1	2.42	.13	<.001***	iM_2	2.29	.15	<.001***	iM_3	2.01	.15	<.001***	iM_4	.93	.15	<.001***	iM_5	1.71	.14	<.001***	iM_6	2.84	.14	<.001***	iY	3.18	.82	<.001***
		R^2= .17 F (3, 237) =2.32 p= .08				R^2= .05 F (3, 237) =4.13, p= .007				R^2= .06 F (3,237) =4.94, p= .002**				R^2= .14 F (3,237) =12.85, p= <.001***				R^2= .01 F (3,237) =1.07, p= .36				R^2= .04 F(3,237)=,p=.02*				R^2= .27 F(9,231)=9.41p = <.001***		

Note = * =p<.05; **=p<.01; ***=p<.001., X = Predictor (IV), M = Mediator, Y = Outcome (DV), C = Covariates, β = Beta Value, SE = Standard Error, ST=Screen Time (Independent Variable); PR=Positive Reorientation (Mediator); R = Rumination (Mediator); SS = Social Support; AO = Aggressive Outlet (Mediator); CE = Creative Expression (Mediator); D = Distraction; EF = Executive Functioning (Dependent Variable), SES = Socioeconomic Status (Low), SE = Screen Limit (Yes)

The table shows the significant and positive relationship between screen time (independent variable) and executive functioning (dependent variable). Moreover, the Positive reorientation (mediator) has a positive impact on executive functioning (DV). Rumination (mediator) negatively impacts executive functioning, suggesting that increased engagement in repetitive thinking disturbs cognitive function. Similarly, Social support (mediator) positively impacts executive functioning. Aggressive outlet (mediator) also negatively impacts executive functioning. On the other hand, creative expression, distraction did not have a significant impact on executive functioning.

On the other hand, the covariates socioeconomic status (Low) and screen limit (Yes) don't show any effect on executive functioning (DV).

Table 3.4

Indirect Pathways Between Screen Time, Emotional Regulation, and Executive Functioning (N=241)

Indirect Pathways			
	Y(EF)		
	β	95% of CI	
		LL	UL
X (Screen Time)			
M_1 (Positive Reorientation)	.01	-.03	.01
M_2 (Rumination)	-.01	-.00	-.03
M_3 (Social Support)	.02	-.00	.03
M_4 (Aggressive Outlet)	-.05	-.02	-.09
M_5 (Creative Expression)	.00	-.01	.01
M_6 (Distraction)	-.01	-.03	.01

X = Screen Time (IV), M = Mediator, Y = Executive Functioning (DV),

Overall, the indirect effect of screen time on executive functioning through rumination and aggressive outlet is significant, confirming these relationships. Both rumination and aggressive outlet were found to be negatively mediating the relationship between screen time and executive functioning.

Figure 3.5
Emerged Mediation Model Showing Significant Pathway of Screen Time with Positive Reorientation and Executive Functioning.

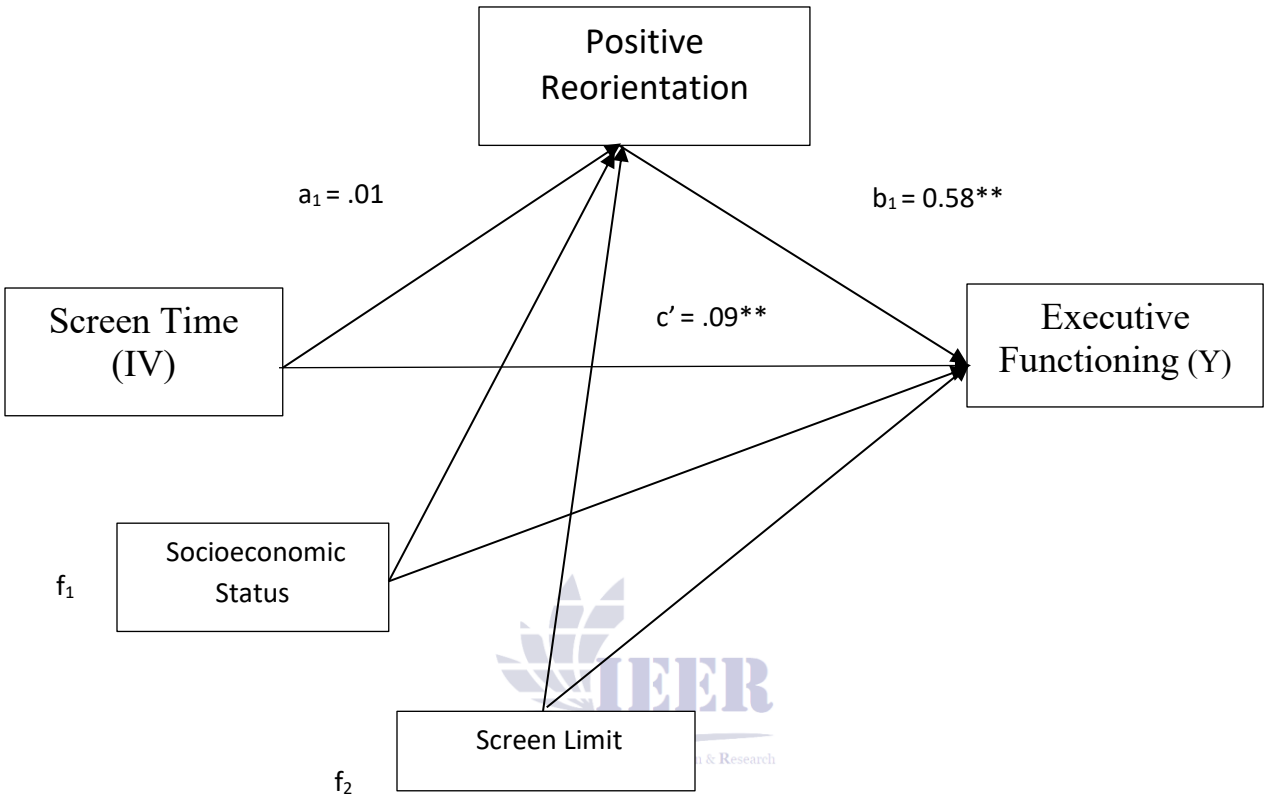


Figure 3.6
Emerged Mediation Model Showing Significant Pathway of Screen Time with Rumination and Executive Functioning.

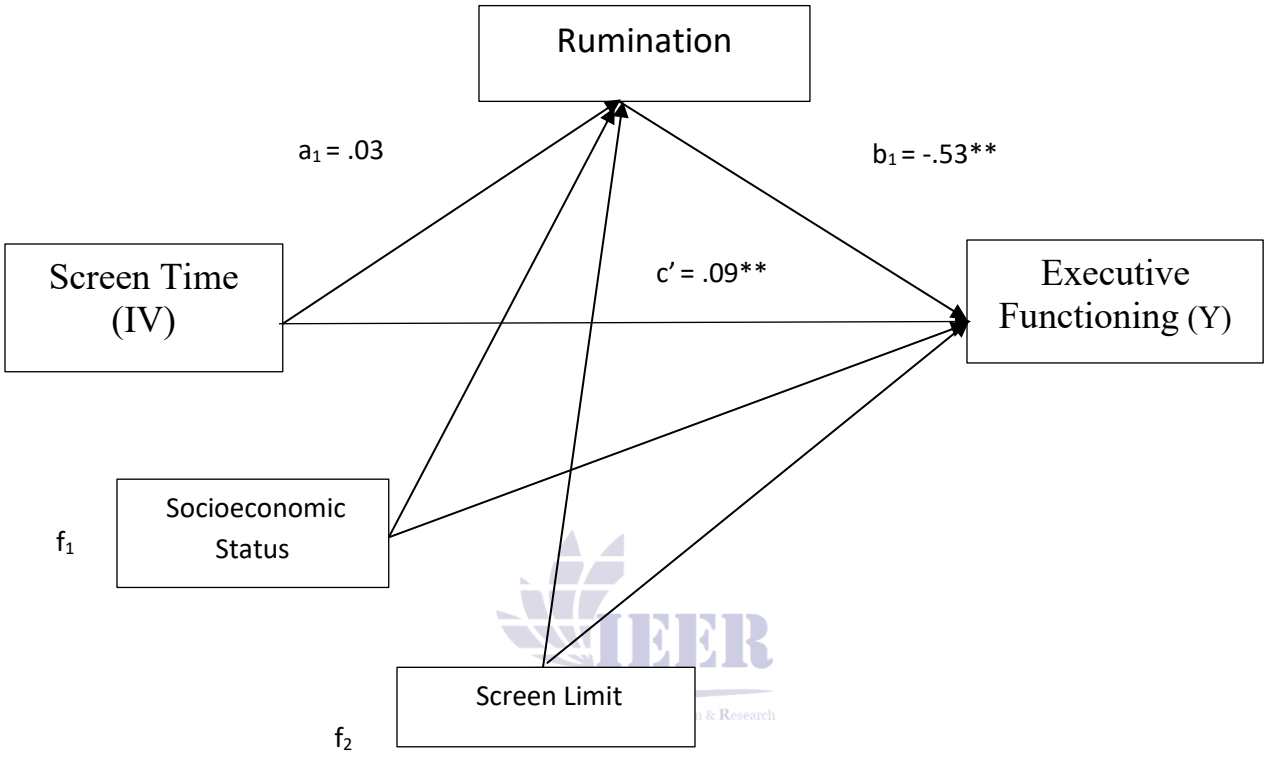


Figure 3.7
Emerged Mediation Model Showing Significant Pathway of Screen Time with Social Support and Executive Functioning.

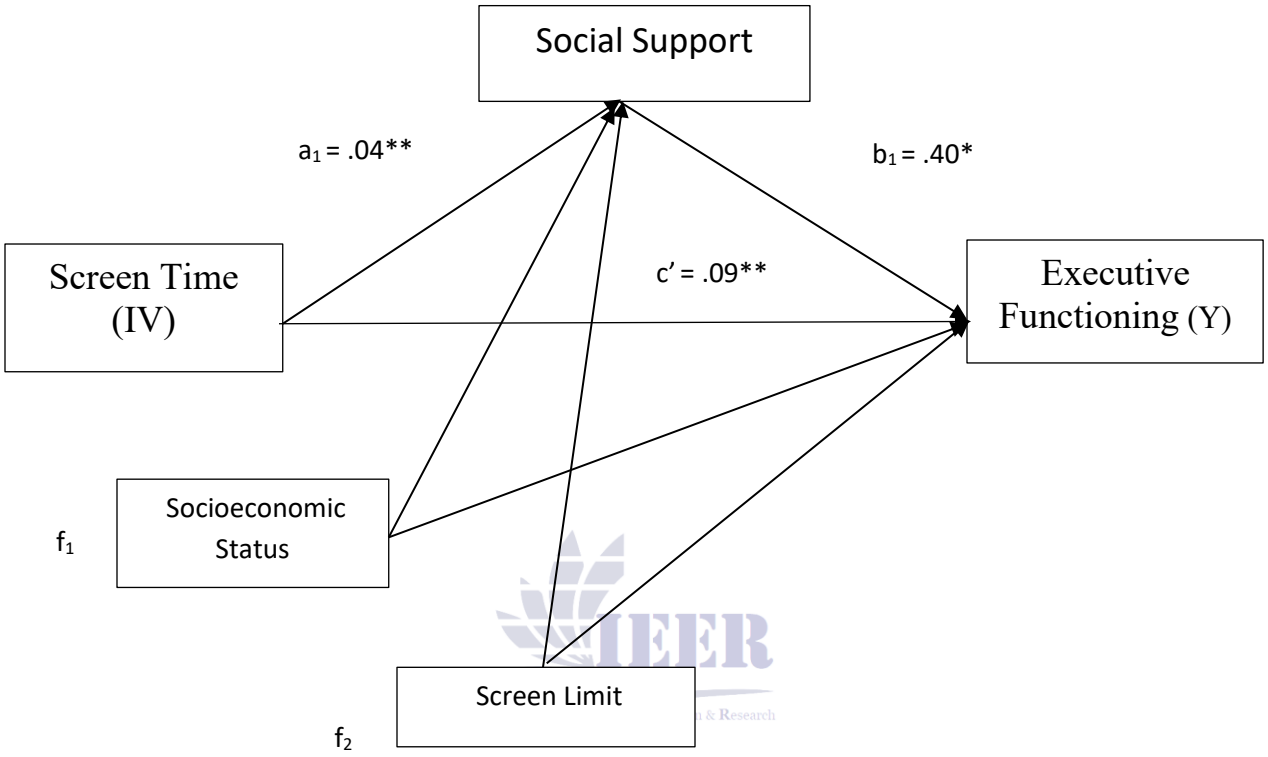


Figure 3.8
Emerged Mediation Model Showing Significant Pathway of Screen Time with Aggressive Outlet and Executive Functioning.

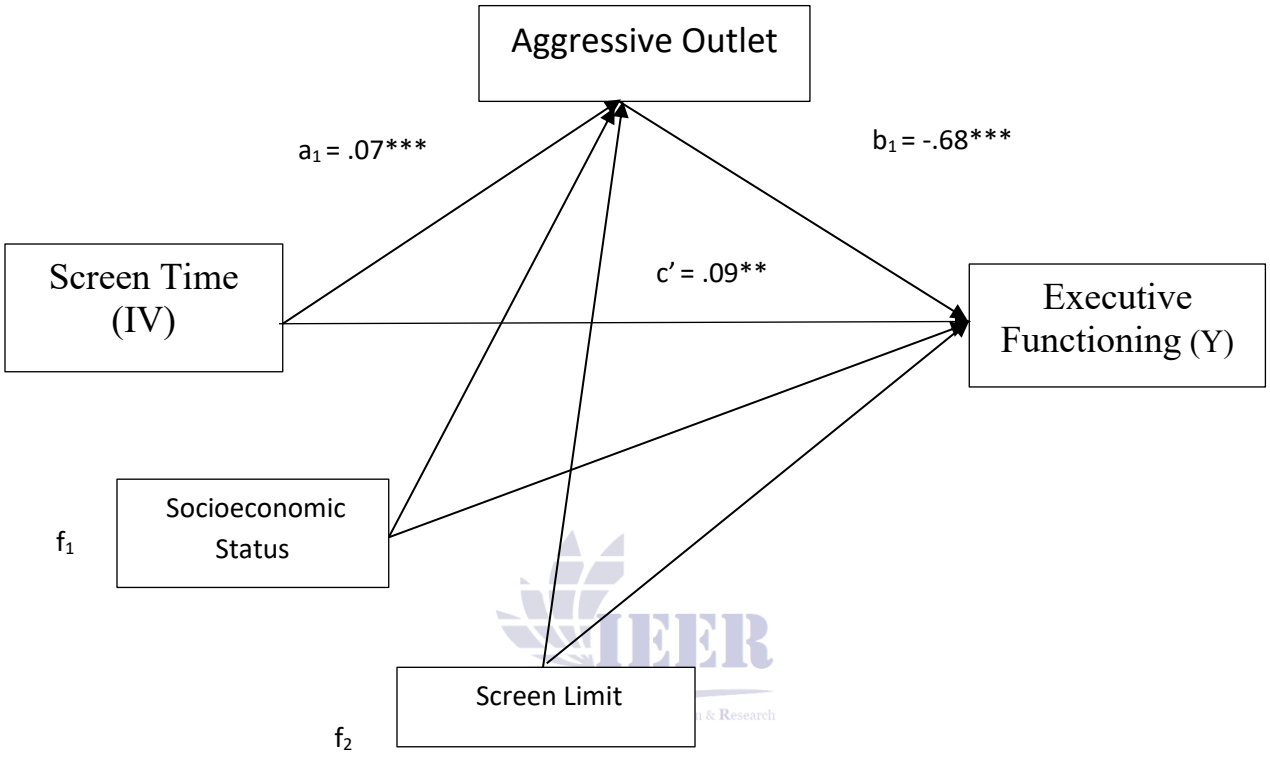


Figure 3.9
Emerged Mediation Model Showing Significant Pathway of Screen Time with Creative Expression and Executive Functioning.

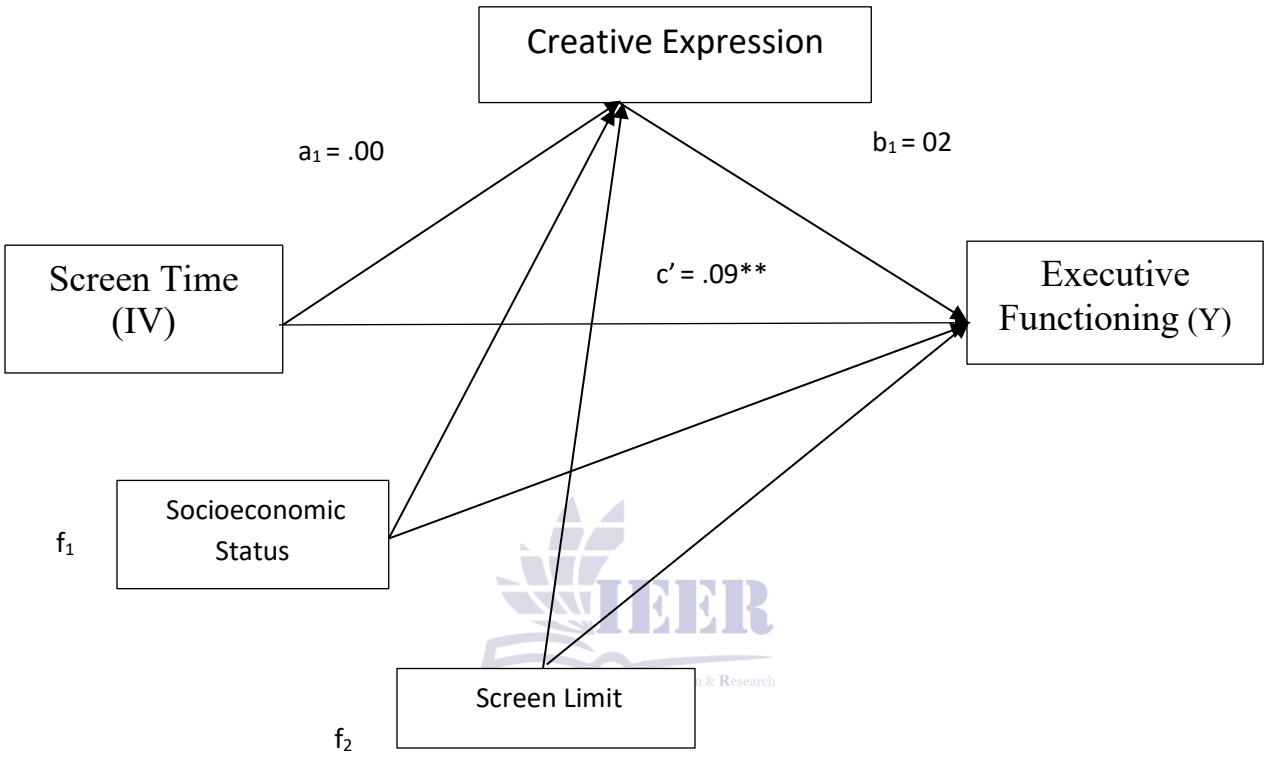
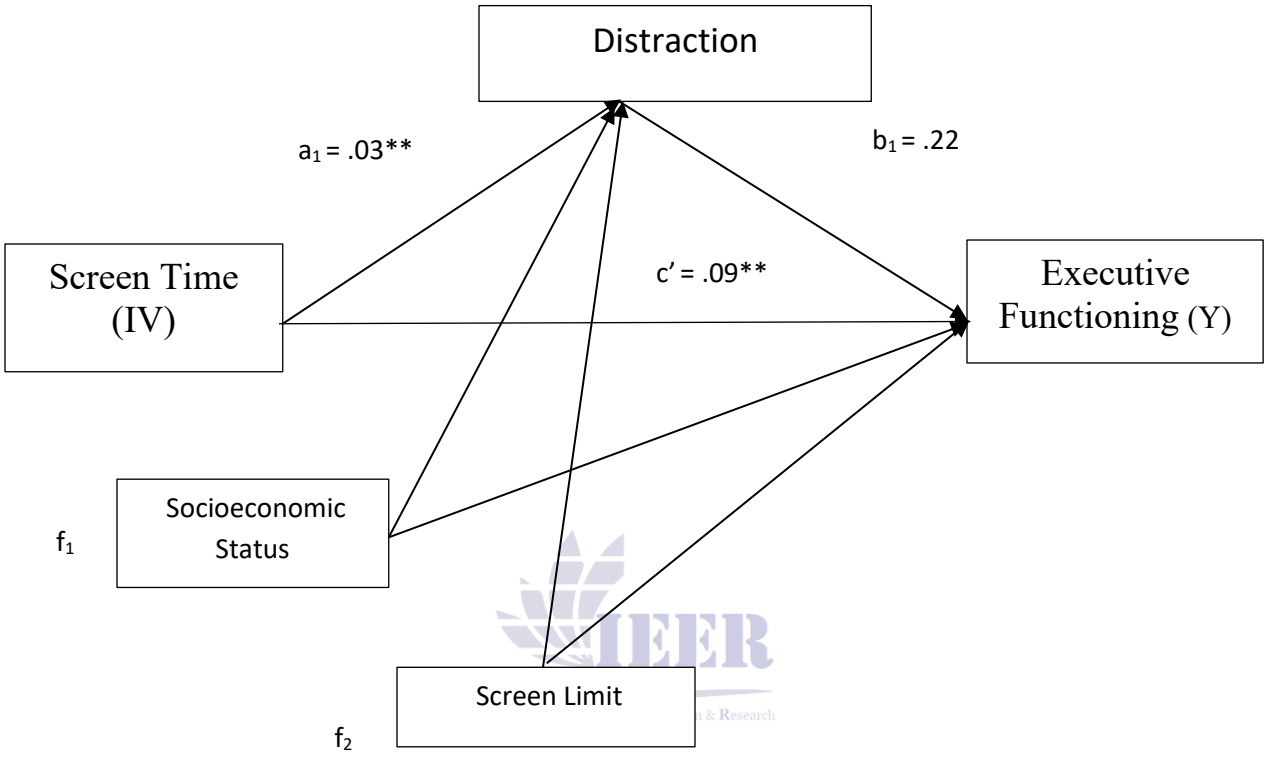


Figure 3.10
Emerged Mediation Model Showing Significant Pathway of Screen Time with Distraction and Executive Functioning.



Discussion

The current study aimed to explore the relationship between screen time, emotional regulation, and executive function in adolescents. The findings revealed a positive relationship between screen time and executive function, suggesting that motivational, educational and skill building content support planning, organization and cognitive flexibility. These findings are consistent with Pakistani culture, as there has been a significant increase in the use of digital devices and technology since the onset of the COVID-19 pandemic (Kim et al., 2025). Lockdowns and social distancing measures forced people to work, study, and socialize from home, leading to a surge in internet usage. While screen usage among children was present even before the COVID-19 pandemic, the post-pandemic period brought a dramatic increase. During lockdowns, students continued their educational activities through online classes, enabling them to stay connected with their teachers and continue learning from their homes.

The results indicated that on average, adolescents spend 10 - 11 hours engaging with screens. This screen exposure includes both educational content (such as online classes, digital learning platforms, and everyday hacks) and non-educational content (such as entertainment, social media, and games). The Emerging results suggest that constructive screen time enhances executive functioning in adolescents.

Since 2020, a significant number of students in Pakistan have increasingly turned to online

educational videos to support their studies. Whether it's grasping academic concepts, studying for college or university admission entrance exams, or doing coursework, students increasingly use internet resources to help them achieve their academic goals. Along with these academic videos, the rise of artificial intelligence (AI) in the digital age has eased the learning process for students. AI systems provide personalized learning by identifying students' strengths, weaknesses, and learning preferences, and then tailoring the information to make learning more efficient and accessible (Saleem et al., 2025).

Apart from educational uses, platforms like Google and YouTube have also served as a platform for skill development. These platforms provide easy, visual, and step-by-step guidance that supports hands-on learning and enhances practical life skills. Such engagement not only fosters creativity but also contributes to the enhancement of fine motor and task initiation (Kumar, 2024). Additionally, Mindfulness and journaling apps provide exercises that help adolescents reflect on their emotions and manage stress. These tools contribute to the development of emotional awareness, coping skills, and behavioral regulation.

Social media offers a variety of informational and motivational content, this exposure improves adolescents' analytical thinking skills and broadens their awareness of different topics (Vaingankar et al., 2021). Adolescents who engage with inspirational content like success stories, TED Talks, or personal development videos are more likely to develop positive reorientation as an emotion regulation strategy. This type of content encourages them to view challenges as opportunities for growth**,** promoting an optimistic outlook. The Online communication with friends provides a safe space for socially anxious or isolated teens to disclose feelings, build friendships, and receive validation, which reduces feelings of loneliness and depressive symptoms, leading to better functioning later on (O'Day & Heimberg, 2021).

Games such as puzzles, brain teasers, and logic-based challenges play a significant role in enhancing cognitive development among children and adolescents. These games require players to analyze patterns, apply reasoning, and think critically to arrive at solutions, thereby strengthening problem-solving skills (Weng, 2022). Engaging in such mentally stimulating activities also supports working memory, as players must hold and manipulate information in their minds while navigating toward the correct answer. Some studies have shown that frequent interaction with puzzles like crosswords, Sudoku, or other matching games not only increases concentration and focus but also enhances cognitive flexibility and processing speed (Aliyari et al., 2021). As a result, these games are increasingly recognized as effective tools in promoting executive functioning and lifelong learning abilities in youth.

The second major finding of the study was that rumination and aggressive outlet negatively mediated the connection between screen time (IV) and executive functioning (DV). The exposure to violent content on social media platforms is positively correlated with real-life aggression, supporting the social learning theory that adolescents imitate aggressive behaviors observed online, such as shouting, yelling, and throwing object (Oshodi, 2024). Repeated engagement with violent games not only triggers short-term increases in anger and hostility but, over time, also alters cognitive structures related to aggression, potentially fostering a more aggressive personality (Yao et al., 2019). In addition, the rise of social media influencers has significantly shaped adolescent behavior and thought patterns. The individual engages in constant social comparison (Choi et al., 2025) fosters negative thinking patterns, which can ultimately impair their executive functioning.

Low socioeconomic status predicted weak executive functioning, whereas better executive functioning was associated with parental restrictions on screen time, with the importance of guidance and supervision. Altogether, the research shows that screen time itself is not necessarily bad but rather its consequences can be negative based on the content and the purpose of use. Adaptive, well-organized screen time is beneficial to

cognition, but uncontrolled, emotional use impair performance. Consequently, instead of simply cutting on the screen time, parents and educators should support the healthy, constructive, and emotionally balanced online behaviors.

Strength of Study

The most significant strength of this research lies in its integrated examination of emotional regulation as a mediating mechanism between screen time and executive functioning among adolescents aged 11 to 18 years**.** While prior studies have often assessed screen time and executive functioning in isolation, this study contributes to the literature by uncovering the underlying emotional processes that explain how screen exposure influences cognitive functioning.

Limitations and Suggestions

One of the primary limitations of the present study is that it did not account for the type or quality of screen content consumed by adolescents. The study focused solely on the duration of screen time, without distinguishing whether the content was educational, recreational, social, or entertainment-based**.** Furthermore, the purpose of screen use, whether for academic learning, communication, relaxation, or passive scrolling, was not identified. This lack of content-specific analysis limits the interpretation of how different types of screen engagement impact executive functioning.

Future Implications

The findings of this study offer several important implications for future research. First, future studies should consider analyzing the specific types of screen content (educational vs. non-educational) to better understand their distinct impacts on executive functioning. Additionally, longitudinal research is recommended to establish a link between screen time, emotional regulation, and executive functioning. The development of interventions and digital guidelines that promote healthy emotional coping strategies, to enhance adolescents' cognitive skills. Furthermore, the study highlights the need for parental and educational awareness, emphasizing that both the quality of screen content and adolescents' emotional responses play a key role in shaping cognitive outcomes.

Conclusion

The current study investigated the association between screen time and emotional regulation and executive function in adolescents. The findings indicated that there was a significant positive weak correlation between screen time and executive performance, showing that adolescents with greater screen use performed better in executive functioning. This result is explained by the fact that being exposed to more educational materials, motivational videos, and skill-building platforms contributes to cognitive development.

In addition, some Emotional regulation strategies like rumination and aggressive outlets have been identified to mediate this relationship negatively, which implies that excessive or unregulated exposure to screens leads to emotional dysregulation and compromised cognitive abilities. In conclusion, screen time should be discussed not only in terms of time but also content, purpose, and context. Educators and parents are encouraged to guide adolescents toward constructive screen use**,** fostering emotional skills and executive control rather than merely limiting screen time.

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