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Systematic Review of Screen Time Impact on Adolescent Learning and Mental Health

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Abstract

Technology integration has become crucial to education in the post-COVID era, offering new learning opportunities but also raising concerns about the effects of excessive screen time on adolescents. This study investigates the effects of screen use on academic performance and mental health, focusing on gender differences. Guided by the 2020 PRISMA framework, a systematic review synthesizes 27 empirical studies on screen time, academic outcomes, and psychological well-being. Findings indicate complex screen time's effects: moderate use can support learning and social connection, but excessive use (four to seven hours daily) is consistently linked to depression, anxiety, attention problems, cognitive decline, and problematic social media behaviors. Impacts vary depending on the purpose of use, pre-existing mental health conditions, and social context. Educational technology functions as both a facilitator and a barrier, depending on implementation. Gender patterns are evident, with girls showing more declines in mental health and life satisfaction during early adolescence, while boys face notable but often underrecognized emotional and physical risks. This review highlights the dual nature of digital engagement and underscores the need for balanced, intentional technology use. The results carry practical implications for students, parents, and educators seeking to promote well-being and academic achievement while mitigating risks of excessive screen time.

Keywords: Academic Performance, Mental Health, Screen Time, Studet Well-Being

1. Introduction

Technology integration is a defining feature of the current educational environment, with devices, apps, and digital tools becoming commonplace in classrooms and students' daily routines. During the COVID-19 pandemic, schools in 181 countries closed, leaving 87.4% of globally enrolled students without access to traditional in-person education settings (David et al., 2020). This situation affected more than 1.6 billion students worldwide (UNESCO, 2022), prompting schools to adopt remote learning solutions. While this shift allowed education to continue, it also revealed challenges. A decline in academic performance and rising dissatisfaction among instructors were reported during this period.

Despite these challenges, schools continued to promote high levels of technology integration post-pandemic. Technology integration into education offers substantial benefits, significantly enhancing student engagement (Bond et al., 2020), efficiency, and effectiveness (Ramadhan & Wibowo, 2024). Assistive technology (AT), such as screen readers, text-to-speech converters, audiobooks, and interactive whiteboards, supports students by providing educational, psychological, and social advantages, especially those with disabilities (McNicholl et al., 2021). Technology in education also seeks to prepare students for the demands of the digital age by enhancing digital literacy, defined as the ability to effectively and responsibly use digital tools to access, evaluate, and create information. Digital competency fosters critical thinking, problem-solving, collaboration, and communication skills, which future employers increasingly value (Morgan & Ritzhaupt, 2022).

While integrating technology into education offers numerous benefits, it has also led to the normalization of

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greater screen time for students. Screen time refers to the time spent using a device with a screen, such as a laptop, tablet, computer, mobile phone, or TV, for activities including attending classes, completing homework, and searching for information. These conditions, characterized by prolonged reliance on digital devices for learning, have raised significant concerns. Parents worry that extended screen time may result in mood changes and negatively impact the emotional well-being of students (Seršen & Čagran, 2024). In this study, well-being refers to students' mental and emotional state, including their ability to manage stress, build positive relationships, and maintain resilience and engagement in academic and social contexts.

Although screen time for educational purposes has advantages, it also presents challenges, including mental and physical health issues, as prolonged screen use is linked to poor sleep quality, particularly among inactive adolescents (Santos et al., 2023). Additionally, excessive screen time is associated with increased depression symptoms, heightened stress levels, and digital fatigue, a state of mental and physical exhaustion caused by the overuse of digital devices, which can leave students feeling isolated and disconnected from their peers (Saleem et al., 2024). Beyond the challenges of screen time, disparities in access to digital tools and reliable infrastructure present further issues. Many students lack access to electricity, a stable internet connection, or the financial resources to purchase necessary devices, leaving them at a disadvantage in online learning environments. (UNICEF,2020). The report from UNICEF also stated that two-thirds of the world's school-age children, or 1.3 billion children aged 3 to 17 years old, do not have internet connection in their homes.

Various strategies are being implemented internationally to address the challenges associated with increased screen time. In Singapore, decisive measures such as providing parents with practical guidance on healthy device use, implementing school policies for students, and developing a national health strategy to promote healthier lifestyles are being taken to shape students' habits around device usage, reflecting a proactive approach to managing screen time (Tushara, 2024). Guidelines from organizations like the American Academy of Pediatrics (2016). provide recommendations for parents, including setting screen time limits, modeling appropriate media behavior, creating media-free zones, and engaging with digital content alongside children. Similarly, the World Health Organization (WHO) issued screen time recommendations in 2019, a widely recognized benchmark for healthy screen use among children and teens. To foster healthy screen use, the 2019 World Health Organization has recommended guidelines for screen time. According to those guidelines, children under 2 years of age should maintain zero screen time. Children aged 2 to 5 years should have no more than one hour of screen activity per day, accompanied by co-viewing with an elder sibling or parent. For children who are 6 to 17 years old, they should have two hours or less per day of screen time, and that does not include digital-based homework.

Although certain screen time activities can improve education and learning, too much time spent in front of a screen and multitasking with other media has been related to worse executive functioning and academic performance (Muppalla et al., 2023). It was also found that in the United States, 13-year-olds' average time spent on social media ranges from as low as 4.1 hours per day, while 17-year-olds use it for 5.8 hours per day. Girls spend nearly an hour more on social media than boys (Rothwell, 2023). Since 2015, the average screen time among US teens has increased by 1 hour and 59 minutes (Rideout & Robb, 2023).

2. Research Problem and Purpose

Most global research has linked excessive screen time to declining cognitive development, attention span, memory retention, and mental health. Many schools, especially private and international institutions, prioritize technology as a marketing strategy to attract students and build a respectable reputation (Garipagaoglu, 2013). In regions like **Southeast Asia and the Middle East,** the demand for smart boards and **AI-powered interactive displays** is surging as schools and businesses invest heavily in **technology-driven collaboration tools** (Sabrina, 2025). While digital tools may attract parents and students, their effectiveness in improving student learning must be carefully assessed. Without a clear strategy for implementation, increased reliance on screen devices and technology could lead to detrimental consequences, such as students' lower engagement in studies and screen addiction, rivalry over digital devices and updated gadgets, and more gaps for educational inequalities between private institutions and those with limited access to modern digital tools (OECD Directorate for Education and Skills, 2024). Many previous studies have focused on academic performance or mental health, but few have examined the combined influence of screen time on both. The present study aims to explore this combined influence to help educators design curricula, incorporate balanced screen time management, and promote healthy student digital habits. It also offers the opportunity for more effective educational policies, public health strategies, and family-based interventions to promote healthier screen use. The research equips parents with knowledge about the potential risks of high screen time and effective strategies for managing their children's screen time. Findings can help teens prepare for digital futures.

The PRISMA-guided review process's main purpose is to maintain transparency, state clear research questions, extract and synthesize data, and minimize bias in the review process (Page et al., 2021). The review also aims to identify **recurring constructs** and **empirical patterns** related to screen time, academic performance, mental health, and gender in adolescent studies.

2.1 Research Questions

The study explores how screen time influences academic performance and mental well-being among high school students who are approximately 13-19 years old. As screen use becomes more common in schools and homes, concerns about its effects have grown. These effects may vary depending on students' gender. This research aims to fill the gaps by addressing the following questions.

RQ1. How is adolescent mental health associated with screen time exposure?

RQ2. How is screen time associated with adolescents' academic performance?

RQ3. How do associations between screen time and (i) mental health and (ii) academic performance differ by gender?

These research questions aim to synthesize the key findings of the systematically reviewed articles by categorizing the influence of screen time and different aspects of academic performance and mental well-being among students. They also help in explaining what the research is aiming to discover by narrowing the scope and guiding the methodology, leading to data analysis and evidence-based conclusions.

3. Research Design

To ensure consistency and filter out irrelevant studies, the research focused specifically on adolescents. It examined empirical studies with cross-sectional and longitudinal designs that explored screen time, device use, digital learning, academic success, and mental health. A qualitative synthesis was used rather than a meta-analysis, as the included studies show variation in study designs, measured outcomes in different ways, and reported results differently. The differences limited the ability to combine the results statistically. Articles included were peer-reviewed as they provide credibility, academic integrity, evidence-based, real-world data, and relevant findings. As the focus of the study is on students' screen time after the COVID-19 pandemic, articles published after 2019, which focused on teenagers or high school students, examining mainly screen-time usage, were selected. It also reflects recent technological and social changes, helping to ensure up-to-date data and policies. Selecting those articles also minimizes obsolete research. Therefore, articles were excluded if they were not empirical, not peer-reviewed, published before 2019, or focused primarily on teachers, parents, or other non-student groups. Searches were conducted using Google Scholar and ERIC, as those databases have wider resources that are publicly available. Searches were completed at the end of January 2025. With the use of those databases, only peer-reviewed articles in the field of education are selected (See Figure 1). Table 1 presents the information along with the relevant criteria in detail.

Table 1: Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion
Publication Type	Peer-reviewed journal articles	Not peer-reviewed (e.g., opinion pieces, editorials, reports)
Publication Date	Published after 2019	Published before or during 2019
Language	English	Languages other than English
Population Focus	High school students or teenagers	Primary focus on parents, teachers, or other groups
Topic	Focuses on screen-time usage (mobile, computer, digital devices)	Does not focus on screen-time usage
Research Method	Empirical research (qualitative, quantitative, or mixed-methods)	Non-empirical research, systematic reviews

3.1 Search Strategy

The search included a combination of **Boolean operators** (AND, OR) **as** they increase the precision and relevance of the search results by narrowing or expanding the search area. **Keyword strings,** developed based on systematic coding of related literature, such as academic motivation, digital device use, were also utilized. Filters such as publication year, language, and population type were also applied to capture relevant studies.

Table 2: Search String

Database	Search String	Results
Google Scholar	"Screen Time" AND "Student Academic Performance"	30
	"Screen Time" AND "Student Mental Health"	107
	"Screen Time" AND "Student Well-Being"	87
	"Screen Time" AND "Student Digital Literacy"	3
	"Screen Time" AND "Student Gender"	3
	"Screen Time" AND "Digital Distractions"	23
	"Screen Time" AND "Organizational Skills"	20
	"Screen Time" AND "Student Motivation"	117
	"Screen Time" AND "Student Concentration"	3
	"Screen Time" AND "Student Learning Environment"	1
	"Screen Time" AND "Myanmar"	60
	Total Results	**454**
ERIC	"Screen Time" AND "Student Academic Performance"	3
	"Screen Time" AND "Student Mental Health"	2
	"Screen Time" AND "Student Well-Being"	1
	"Screen Time" AND "Student Digital Literacy"	0
	"Screen Time" AND "Student Gender"	2
	"Screen Time" AND "Digital Distractions"	0
	"Screen Time" AND "Organizational Skills"	0
	"Screen Time" AND "Student Motivation"	3
	"Screen Time" AND "Student Concentration"	0
	"Screen Time" AND "Student Learning Environment"	0
	"Screen Time" AND "Myanmar"	0
	Total Results	**11**

3.2 Coding Process

An Excel template was created to ensure consistency in the review process, recording bibliographic information, documenting article eligibility, and preparing content for analysis. The template was adjusted to reflect key thematic domains from the conceptual framework. The coding process combined manual procedures with digital analysis using ATLAS. ti (Version 25), following a structured qualitative content analysis approach. A hybrid strategy of deductive and inductive coding was applied. Initial coding categories were informed by established screen time-related constructs, including usage duration, content type, screen time purpose (educational vs. recreational), academic impact, mental health effects, and gender differences. These initial codes functioned as sensitizing concepts (Bowen, 2006), guiding early analysis while allowing for revision based on the data.

All extracted textual data were imported into ATLAS.ti to facilitate systematic coding, memo writing, and iterative comparison. As the analysis progressed, the preliminary codes were reorganized into categories relevant to this study: screen time duration, device usage, academic motivation, academic performance, study habits, mental health effects such as anxiety, depression, stress, and gender differences (See Table 5). Sub-codes were developed within each category to capture more detailed aspects of the data. This approach followed the recommendations of Elo and Kyngäs (2008), emphasizing both abstraction and categorization to ensure conceptual clarity. To enhance consistency, the coding framework was improved, and previously coded studies were rechecked after theme development.

Manual coding was conducted in parallel during the development phase to calibrate interpretations, resolve

discrepancies, and strengthen reliability. ATLAS.ti further enabled the visualization of code relationships and supported the management of complex datasets across sources. This integrated strategy enabled a transparent, iterative, and rigorously grounded analytic process, consistent with the principles of qualitative content analysis (Hsieh & Shannon, 2005).

3.3 Synthesis of the Results

To gather information systematically from the reviewed articles, a data extraction sheet was used. A data extraction sheet is a tool used to collect, organize, and record key information from existing studies for comparison and analysis (Higgins et al., 2022). Because studies used different methods, populations, and ways of measuring outcomes, a qualitative content analysis was used to organize the findings. Main categories were coded deductively, based on the research questions about mental health, academic performance, and gender differences. Within each category, findings were coded inductively to identify common patterns and important themes. This approach allowed the review to show both the direction of findings and their depth across different types of research (See Appendix 1).

3.4 Study Selection Process

The systematic review (Figure 3) started with 465 identified articles, from which 51 duplicates were removed, leaving 414 articles. A screening of titles and abstracts excluded 321 studies that did not match the inclusion criteria as they focused on an irrelevant age group, were not peer-reviewed, were unrelated to the topic, or were published before 2019, or keywords were not mentioned clearly. Of the remaining 93 articles reviewed in detail, nine could not be accessed due to restrictions, publisher access limits, and technical issues. After applying the established criteria again, 57 articles were excluded for not meeting the study's specific scope relating to the students' age groups, study methods, not answering the research questions, or undefined population. The final systematic review included 27 articles for analysis and examination (Appendix 2). Figure 1 is the PRISMA flow diagram to explain the identification process.

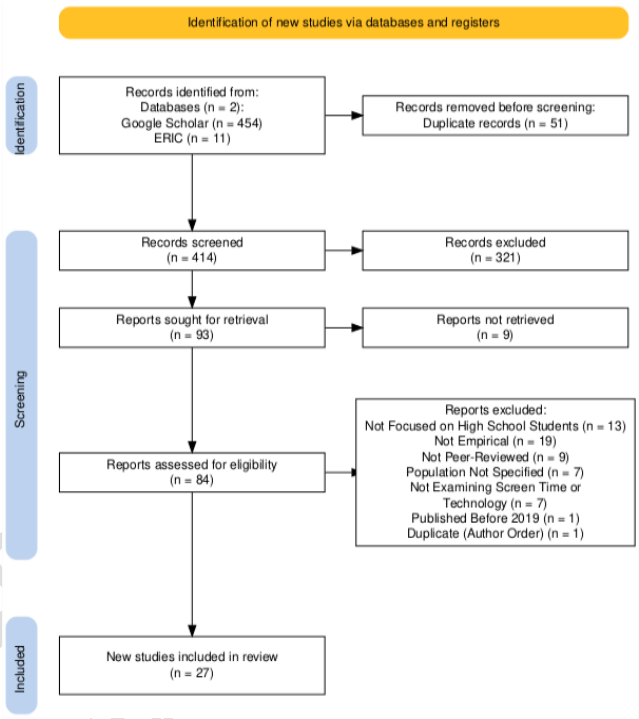

Figure 3: PRISMA Flow Diagram

4. Results and Discussion

Table 4 presents information explaining the coding process that led to the final content. After initial coding, similar codes were grouped to identify common patterns and relationships. These groups were then named to form subthemes. Indicators help define and clarify each theme by highlighting specific ideas, behaviors, or patterns. For example, for the theme **Academic Performance**, indicators might include terms such as academic motivation, learning outcomes, and grades. These indicators guide the coding process. Although screen time is generalized as a single measure, different screen-related activities such as social media use, gaming, trigger different outcomes.

Table 4: Findings

Overarching Theme	Conceptual Subthemes	Indicators (Examples, Constructs, or Keywords)
Mental Health	Emotional and Psychological Symptoms	Anxiety, Depression, Mood Swings, Irritability, Emotional Regulation, Stress Symptoms
	Sleep and Cognitive Function	Sleep Disruption, Sleep Duration, Screen Use Before Bed, Cognitive Fatigue, Attention Span
	Social Withdrawal and Isolation	Reduced Social Interaction, Loneliness, Avoidance of Peer Activities, Preference for Online Interaction
Academic Performance	Academic Engagement and Study Habits	Homework Completion, Study Time, Focus During Tasks, Learning Motivation, Academic Discipline
	Grade-Related Outcomes	GPA, Test Scores, Assignment Scores, Class Rankings
	Digital Multitasking and Distraction	Task Switching, Attention Interruption, Use of Multiple Devices, Background Media Use
Gender Differences	Patterns of Screen Time Use by Gender	Social Media Use (Girls), Gaming (Boys), Device Preference, Type of Content Consumed
	Gender-Specific Impacts	Girls: Anxiety, Body Image Concerns; Boys: Aggression, Reduced Sleep; Differences in Self-Regulation
	Perceptions and Coping Strategies	Gendered Coping Responses, Self-Perception of Screen Dependency, Emotional Expression Differences

4.1 Screen Time and Adolescent Mental Health

Mental health is a state of well-being that enables individuals to cope with life's stresses, recognize their abilities, learn effectively, work productively, and contribute to their communities (World Health Organization, 2019). Screen time effects on mental health are nonlinear, as small amounts may be beneficial, but excessive use is clearly harmful to emotional health (Przybylski et al., 2019). According to the World Health Organization (WHO), mental health conditions include mental disorders, psychosocial disabilities, and other mental states associated with significant distress, impaired functioning, or risk of self-harm. Mental health is not just the absence of mental disorders; it involves emotional, psychological, and social well-being that supports decision-making, relationships, and overall life satisfaction. The National Institute of Mental Health (NIMH) identifies depression, anxiety, and stress-related disorders as the primary mental health concerns. Globally, mental health conditions represent a significant disease burden for adolescents. Numerous studies have also demonstrated a link between excessive screen time and negative mental health outcomes in adolescents.

4.1.1 Anxiety and Depression

The use of excessive screen time limits real-life social contact, which can heighten feelings of loneliness and contribute to depression among adolescents (Twenge & Campbell, 2018). Research has shown that screen time exceeding seven hours per day is significantly associated with higher levels of depression (Ali et al., 2021). Even four hours of daily screen time can lead to significantly increased odds of depression and anxiety compared to no screen time, with sleep duration not mediating these relationships (Leung & Torres, 2021). Leung and Torres (2021) further found that screen time greater than four hours on weekdays is linked to adolescent depression and anxiety. Similarly, Khouja et al. (2019) reported that increased screen time, especially computer use, is associated with a higher risk of anxiety and depression. Studies focusing on adolescents revealed that individuals with high screen time were more than twice as likely to be diagnosed with depression or anxiety, to have received treatment from a mental health professional, or to have taken medication for psychological or behavioral issues (Ali et al., 2021). Those adolescents were also at higher risk of experiencing short sleep duration, delayed sleep onset, and increased overall sleep duration (Ali et al., 2021). Furthermore, Ali et al. (2021) noted that psychological symptoms increased only with elevated screen time on phones. Khouja et al. (2019) additionally found that increased screen time, particularly computer use, was linked to a modest increase in the risk of anxiety and depression

Poor mental health may also contribute to the development of problematic social media use (SMU). According to the cognitive-behavioral model, by Davis (2001), individuals experiencing psychological issues such as depression are more likely to develop maladaptive beliefs about social media (Caplan, 2003; Davis, 2001; Griffiths, 2013). For example, adolescents holding such beliefs might

perceive their offline lives as unfulfilling or use social media to escape negative emotions (Davis, 2001). Consequently, they may come to rely heavily on SMU as a coping mechanism, potentially resulting in stress, anxiety, or addiction-like behaviors (Griffiths, 2013). Based on this framework, it is expected that lower levels of mental health are linked to increased SMU problems. Boer et al. (2020) supported that adolescents who experienced more SMU problems over time also showed greater depressive symptoms and lower life satisfaction one year later.

Time spent alone was found to lessen some of these associations, suggesting a need for further research into moderating factors. Their findings indicate that higher computer use at age 16 is associated with a greater likelihood of experiencing depression and anxiety by age 18, although causality cannot be established. After controlling for possible confounding factors, there was minimal evidence that time spent texting or watching television significantly affects the risk of anxiety and depression. This suggests that the connection between screen time and mental health is more complex than a simple increase in screen time leading to a greater risk.

4.1.2 Mental Well-Being

Manwell et al. (2022) stated that excessive screen time of more than two to three hours per day can impair attention, making it difficult for students to concentrate during lessons. They also noted that prolonged screen use may have long-term cognitive effects resembling symptoms of dementia. Supporting these findings, Shafaqat and Sharif (2023) observed that individuals who heavily use digital devices tend to have shorter attention spans and diminished memory recall. Twenge and Farley (2020) further found that time spent on social media and internet use was more strongly associated with self-harm behaviors, depressive symptoms, low life satisfaction, and reduced self-esteem than time spent on electronic gaming or television viewing, as the use of social media involves social comparison, peer feedback loops, FoMO, and exposure to harmful content. Additionally, adolescents who experience Fear of Missing Out (FoMO), which is defined as having a pervasive apprehension that others might be having rewarding experiences from which one is absent (Przybylski et al., 2013), may suffer from social stress or anxiety related to their peers' lives, which can lead to excessive smartphone use (Wang et al., 2019). Chan et al. (2022) introduced a social media FoMO to JoMO (Joy of Missing Out) framework, where they describe how mindless use can lead to social media FoMO and proposed a novel Social Media Mindfulness Practice (SMMP) as a remedy to help users reduce FoMO and adopt a path called JoMO that provides greater well-being.

Manwell et al. (2022) explored the cognitive impact of excessive screen exposure in adolescents and young adults, finding impairments similar to those seen in individuals with Mild Cognitive Impairment (MCI). These impairments included reduced concentration and orientation, along with declines in social functioning and self-care. The study also identified increased risks of dementia-like symptoms in adulthood, long-term declines in IQ, learning difficulties, and psychiatric disorders. These negative effects and promote cognitive well-being.

4.1.3 Cognitive and Behavioral Risks

Wallace and Russ (2023) found that the use of social media, television, and video gaming was significantly associated with increased symptoms of Attention-Deficit/Hyperactivity Disorder (ADHD) in adolescents. Similarly, Throuvala et al. (2019) emphasized that adolescents often experience a progressive loss of control due to emotional, cognitive, and behavioral mechanisms triggered by their interactions on social media platforms. Throuvala et al. (2019) also identified mechanisms, such as fear of peer evaluation, loss of attentional focus, and platform-induced compulsions, that tend to reinforce one another, intensifying the quality and frequency of engagement, which may lead to problematic or addictive use patterns. Craig et al. (2020) also argued that problematic social media use, which displays signs of addiction, puts adolescents at risk by increasing the likelihood of engaging in dangerous online interactions with strangers that can contribute to social withdrawal and deteriorated social functioning. Craig et al. (2020) further noted that exposure to aggressive online behaviors (AOB) such as cyberbullying, trolling, online shaming, flaming, and disseminating harmful or irritating material may lead to their normalization among youth, increasing the chances of engaging in or becoming victims of cyberbullying. Adolescents who excessively use electronic communication may also be more vulnerable, especially those already experiencing psychosocial difficulties such as loneliness and social anxiety. In addition to time spent alone, Khouja et al. (2019) suggested that various other mechanisms might explain the relationship between screen time and increased levels of anxiety and depression.

a. Screen Time and Academic Performance

Adolescents utilize digital devices for a variety of purposes, including both **educational activities,** such as completing homework, attending online classes, and conducting research, and **recreational use**, including gaming, video streaming, and social media engagement (Rideout et al., 2022). According to Earp's (2020) research study, the amount of time children and teenagers are spending on digital technology inside and outside school is having a significant impact on their classroom learning and physical and mental well-being. Although educational

technologies provide valuable ways to organize information, assess student work, and provide a way for students to stay connected to learning during absences (Loveland, 2022), Wexler (2019) reported that technology is frequently unhelpful for learning because students have fewer interpersonal interactions, absorb less information, are more distracted, and are less motivated. Chada et al. (2023) noted that excessive screen use, especially through video games and mobile devices, leads to reduced sleep duration, increased daytime drowsiness, and lower academic performance. Similarly, Patel et al. (2023) found a significant negative correlation between screen time and academic achievement, stating that students using screens for over three hours daily had an average grade of 62.1%, whereas those with minimal or no screen media use scored an average of 88.4%. These effects were further intensified during the COVID-19 pandemic (Pérez-Jorge et al., 2024), and the negative impact of screen time on school performance was more pronounced in older adolescents (Patel et al., 2023).

The dichotomy in research outcomes underlines the complexity of technological integration in schools. While some studies report increased student motivation as a result of educational technology use (Barzani & Jamil, 2021; Jasim & Salman, 2023; Widyana, 2022; Yurdagül & Öz, 2018), other research highlights the damaging academic effects of excessive screen time and technology dependency among adolescents (Chada et al., 2023; Patel et al., 2023). One possible explanation for these conflicting findings lies in the underlying psychological tendencies of adolescents. Wang et al. (2019) identified two primary drivers of screen time addiction in this group: Fear of Missing Out (FoMO) and procrastination. Students may turn to the internet as a source of immediate gratification, leading to compulsive use that displaces academic activities (Nadarajan, 2023). Procrastinators, who tend to be present-focused and low in conscientiousness, are particularly vulnerable to distraction and temptation (Svartdal et al., 2020). FoMO intensifies the perceived need to remain constantly connected to others' online experiences, further reinforcing patterns of compulsive digital engagement (Rozgonjuk et al., 2020; Wang et al., 2019). These addictive mechanisms contribute to sleep disturbances, academic underperformance, and heightened stress and anxiety (Pérez-Jorge et al., 2024). The long-term consequences of persistent screen time addiction are significant.

Some studies now focus on how using technology in thoughtful and planned ways can reduce the risks and help students learn better. Jasim and Salman (2023) noted that not all screen time has adverse effects. When interactive technologies and multimedia tools are purposefully integrated into English language instruction, they can significantly enhance students' reading, writing, listening, and speaking skills. This suggests that while excessive or unstructured screen use may harm academic performance, well-designed educational technologies can support and enrich learning outcomes. Shafaqat and Sharif (2023) found that digital tools can both hinder and enhance memory, as digital formats may reduce memory retention compared to printed materials, possibly due to less effective cognitive encoding. Lee et al. (2024) findings suggest that technological interventions, along with structured educational and workplace strategies, can mitigate adverse effects while promoting cognitive health. Taken together, these findings highlight the dual role of educational technology, both as a cognitive barrier and a facilitator, with its impact determined largely by how it is implemented.

b. Gender-Specific Effects of Screen Time

Adolescence is a stage characterized by distinct physical, cognitive, and social-emotional changes, with variations by gender, particularly regarding the timing and nature of puberty and the emergence of certain emotional patterns such as depression (*Allen et al., 2019).* Gender differences in psychological well-being often become more visible during this period and may extend into emerging adulthood, influencing how individuals experience stress, anxiety, and depressive symptoms (Matud et al., 2021). Kleidermacher and Olfson (2023) identified a significant interaction between gender and screen time; their findings suggest that screen time may intensify emotional vulnerabilities in gender-specific ways.

Numerous studies have explored the different impacts of screen time on male and female adolescents. Ali et al. (2021) reported that a screen time of more than seven hours per day was significantly associated with higher depression and anxiety, especially among female students, as girls have a higher tendency to dwell on content on social media and to compare themselves with others (Nesi & Prinstein, 2015; Underwood & Ehrenreich, 2017). Studies by Boer et al. (2020) and Twenge and Martin (2020) further support the findings that female students are more prone to adverse psychological effects with increased screentime usage. Twenge and Martin (2020) stated that media use tends to have a more negative impact on girls' psychological well-being, as adolescent girls spend more time on smartphones, social media, texting, general computer use, and online activities, while boys spend more time gaming and using electronic devices in general. Sampasa-Kanyinga et al. (2020) noted that female adolescents spend a significantly longer time using their smartphones and engaging with social media and texting. As Twenge and Farley (2020) explained, the longer adolescents engage in social media, the likelihood of adverse outcomes, self-harm, depression, low self-esteem, and low life satisfaction substantially increases.

Females who spend extended time on social media are not only more likely to experience internal struggles such as depression and low self-esteem, but also have greater exposure to harmful interactions online. Problematic use and frequent communication with strangers have been linked to higher risks of cyberbullying, especially among girls, and also show stronger associations with cyberbullying behavior itself (Craig et al., 2020). Twenge and Farley (2020) found that cyberbullying, poor sleep, and low physical activity help explain how social media use is connected to negative mental health outcomes for girls. Twenge et al. (2022) further argued that the mental health impact of social media may be as serious as other major adolescent risks, including binge drinking, sexual assault, obesity, and drug use, as they both trigger peer pressure, and emotional vulnerabilities and its pervasive, daily, and compulsive nature can impact on mental health such as pression, anxiety, low self-esteem, and social isolation which are equally or more severe. Data from South Korea's 2021 Youth Risk Behavior Survey found that girls with both binge drinking experience and depressive mood had dramatically higher odds of suicide attempts, twenty-two times higher than non-drinking, non-depressed peers (Lee & Lee, 2022). These findings suggest that heavy social media use contributes to emotional harm by increasing adolescents' exposure to online risks, with girls facing greater vulnerability to those effects.

High use of digital media is associated with lower psychological well-being in both genders, but the effects tend to be stronger for adolescent girls (Twenge & Martin, 2020). Research consistently shows that women report higher levels of negative emotions and lower scores on most positive emotions compared to men, revealing a persistent gender gap in well-being (Blanchflower & Bryson, 2024). A longitudinal study by Yoon et al. (2022) explored gender differences in the change of adolescents' mental health and subjective well-being among 11-to 14-year-olds, for over 3 years, and found that young people are at increased risk of mental health problems between those ages, particularly girls.

Although girls are more frequently the focus of research on emotional risks tied to digital media use, recent studies suggest that boys also face specific challenges. Yoon et al. (2022) observed a decline in mental health and life satisfaction among both genders between ages 11 and 14, though the rate of decline was steeper for girls. However, boys were not unaffected. Sampasa-Kanyinga et al. (2020) reported that heavy social media use was associated with higher BMI-for-age z-scores in boys, with sleep playing a key role in that relationship. Blanchflower and Bryson (2024) also noted that while females report more negative emotions overall, males tend to report lower levels of life satisfaction and positive emotion, suggesting that boys may internalize distress differently. These findings show that screen time risks are not exclusive to girls and that the emotional and physical impacts on boys may be underexamined.

5. Conclusions

Based on the PRISMA 2020 guidelines, this systematic review examines the effects of screen time on academic performance and mental well-being among adolescents. Findings from the reviewed empirical studies indicate that excessive screen time is negatively associated with both academic success and mental health. Several consistent patterns emerged, including reduced academic achievement linked to impaired attention, memory deficits, poor sleep quality, and increased procrastination. Moreover, strong and consistent associations were found between high levels of screen time, particularly related to social media use, and negative mental health outcomes such as depression and anxiety, which significantly affect adolescents' psychological well-being.

Gender differences were also observed. Girls were more adversely affected by social media use, exhibiting higher levels of depressive symptoms, anxiety, and self-harming behaviors, while boys showed comparatively less severe psychological effects. The review also highlights that not all screen time has an equal impact, as the purpose and content of screen use greatly influence the outcomes. For instance, educational technology was generally found to be neutral or even beneficial, whereas excessive social media use and unstructured screen habits were linked to negative effects.

Additionally, fear of missing out (FoMO) emerged as a psychological factor driving screen engagement among students. Most of the included studies employed cross-sectional survey designs, while some adopted mixed-method approaches. By adhering to PRISMA guidelines and incorporating peer-reviewed articles from reputable databases, this review offers a comprehensive overview of the current literature. Overall, while excessive screen time poses risks to academic and mental health, structured and purposeful screen use may contribute positively to adolescent development.

The findings suggest that educators and policymakers should develop clear guidelines relating to healthy screen use among adolescents, and also promote balanced and purposeful screen engagement in learning environments. Parents should collaborate with schools and actively monitor both the amount and type of screen-based activities to support adolescents' academic performance and mental health.

6. Limitations

This systematic review has several limitations, as the included studies varied in study designs, measurement tools, and outcome definitions. In addition, most studies relied on self-reported measures of screen time, which may be subject to recall bias and reporting inaccuracies. The review was also limited by database restrictions, which may have affected the range of studies included. However, the review provides a comprehensive overview of existing evidence on the relationship between screen time, academic performance, and mental health among adolescents.

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Appendixes

Appendix 1: 27 Reviewed Articles

Article No.	Article Title	Published Year
1.	A 'Control Model' of Social Media Engagement in Adolescence: A Grounded Theory Analysis	2019
2.	An Examination of Children's Digital Gaming Habits and Preferred Games	2024
3.	Digital dementia in the internet generation: excessive screen time during brain development will increase the risk of Alzheimer's disease and related dementias in adulthood	2022
4.	Digital Influence on the Mind: Exploring the Impact of Technology on Attention, Memory, and Cognitive Processing	2023
5.	Factors associated with nature connectedness in school-aged children	2022
6.	Fear of Missing Out and Procrastination as Mediators Between Sensation Seeking and Adolescent Smartphone Addiction	2019
7.	Future Time Perspective and Bedtime Procrastination: The Mediating Role of Dual-Mode Self-Control and Problematic Smartphone Use	2022
8.	Gender differences in associations between digital media use and psychological well-being: Evidence from three large datasets	2020
9.	How Can Adolescents Benefit from the Use of Social Networks? The iGeneration on Instagram	2020
10.	Information Technology Use and Cyberbullying Behavior in South Thailand: A Test of the Goldilocks Hypothesis	2020
11.	Investigating the Impact of Multimedia and Mobile Applications in English Language Education	2023
12.	Is screen time associated with anxiety or depression in young people? Results from a UK birth cohort	2019
13.	Not all screen time is created equal: associations with mental health vary by activity and gender	2020
14.	Screen Time Effect on Insomnia, Depression, or Anxiety Symptoms and Physical Activity of School Students During COVID-19 Lockdown in Lebanon: A Cross-Sectional Study	2021
15.	Screen time, impulsivity, neuropsychological functions and their relationship to growth in adolescent attention-deficit/ hyperactivity disorder symptoms	2023
16.	Screen use, sleep duration, daytime somnolence, and academic failure in school- aged adolescents	2023
17.	Screens, Teens, and Psychological Well-Being: Evidence from Three Time-Use-Diary Studies	2019
18.	Sex differences in the relationship between social media use, short sleep duration, and body mass index among adolescents	2020
19.	Sleep Duration Does Not Mediates the Association between Screen Time and Adolescent Depression and Anxiety: Findings from the 2018 National Survey of Children's Health	2021
20.	Social Media Use and Cyber-Bullying: A Cross-National Analysis of Young People in 42 Countries	2020
21.	Social media use intensity, social media use problems, and mental health among adolescents: Investigating directionality and mediating processes	2020
22.	Relationship between Screen Time and Academic Performance in Adolescents	2023
23.	Specification curve analysis shows that social media use is linked to poor mental health, especially among girls	2022
24.	The association between adolescent well-being and digital technology use	2020
25.	The relationship between screen time and mental health in young people: A systematic review of longitudinal studies	2021
26.	Tomorrow Never Comes: The Risks of Procrastination for Adolescent Health	2024
27.	Treatment outcomes of a CBT-based group intervention for adolescents with Internet use disorders	2020