



Screen Time and Its Impact on Physical and Mental Health in Children Aged 11–12 Years: A Systematic Review

By

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Abstract

Background: The rapid expansion of smartphones, tablets, computers, gaming platforms, and social media has fundamentally altered daily routines during early adolescence [1]. This developmental window (aged 11–12 years) is characterized by major biological, psychological, and social transitions [2–4]. Increasing screen exposure during this stage may influence physical activity, sleep, adiposity, mental health, and social functioning [5,6].

Objective: To systematically synthesize empirical evidence regarding the quantitative and qualitative associations between screen time exposure and physical and mental health outcomes specifically among children aged 11–12 years.

Methods: This systematic review was conducted according to PRISMA 2020 guidelines [7]. Systematic searches were executed across PubMed/MEDLINE, Scopus, Web of Science, Embase, PsycINFO, and Google Scholar from database inception through 2026. Observational (cohort and cross-sectional) and intervention studies evaluating screen exposure and physical or mental health outcomes in children aged 11–12 years were included [8,9]. Quality assessment was conducted using the Newcastle-Ottawa Scale (NOS) for cohort studies and the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for cross-sectional studies [10,11].

Results: Of 2,840 identified records, 6 primary studies (N = 34,705 participants total) met all inclusion criteria [12–17]. Higher recreational screen time (greater than 2 hours per day) was consistently associated with shorter sleep duration (beta = -0.21 to -0.34), higher Body Mass Index (BMI) z-scores (OR = 1.28 to 1.42), and lower physical activity levels [12,13,15]. Problematic social media and mobile phone use were significantly correlated with elevated internalizing symptoms, including anxiety (OR = 1.35, 95% CI: 1.12 to 1.63) and depressive symptoms (beta = 0.18, p less than 0.001) [12,14,17]. Methodological appraisals indicated low-to-moderate risk of bias across included primary studies [10,11].

Conclusion: Excessive and problematic screen exposure acts as a significant modifiable behavioral risk factor for adverse physical and mental health outcomes in early adolescence [18–20]. Interventions should target sleep hygiene, bedtime device removal, and content quality rather than focusing exclusively on total screen duration [1,7].

Keywords: screen time, early adolescence, mental health, physical health, pediatric obesity, sleep disruption, anxiety, digital media, systematic review.

1. Introduction

Digital technology has become an integral component of childhood and early adolescence [1,2]. Television, smartphones, tablets, computers, video games, streaming

platforms, and social networking applications provide children with opportunities for communication, entertainment, learning, and social interaction [3,4]. At the same time, the increasing availability of connected devices has raised concerns regarding the potential health consequences of

prolonged or inappropriate screen exposure [5,6].

Contemporary pediatric literature emphasizes that screen time is not a single homogeneous behavior [1,8]. The health implications depend heavily on duration, content, timing, context, purpose, and degree of engagement [2,9]. The American Academy of Pediatrics (AAP) and World

Health Organization (WHO) have moved away from one-size-fits-all duration caps to focus on individualized media planning based on developmental stage and family context [7,18]. Children aged 11–12 years occupy a unique developmental window marking the transition from late childhood into early adolescence [3]. This stage is characterized by increasing autonomy, peer influence, pubertal changes, and rapid cognitive development [4]. Simultaneously, children gain independent access to personal smartphones and social media platforms [14,17].

The relationship between screen use and health is complex and bidirectional [5,19]. Screen exposure may displace physical activity and sleep, promote unhealthy snacking via marketing, or induce psychological distress through cyberbullying and social comparison [6,15,20]. Conversely, children experiencing internalizing symptoms, loneliness, or behavioral difficulties may use screens as a coping mechanism [12,16]. To address the gap in evidence specific to early adolescents, this systematic review synthesized empirical primary literature evaluating physical and mental health outcomes associated with screen exposure in 11- to 12-year-olds.

2. Methodology

2.1 Study Design and Framework

This systematic review was conducted and reported in strict accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement [7]. The core review question was framed using the PECO architecture:

- **Population (P):** Children aged 11–12 years (or studies providing a distinct, extractable subgroup analysis for this age range).
- **Exposure (E):** Screen-based media exposure (e.g., television, smartphones, video games, computers, social media, overall digital media) [1,8].
- **Comparator (C):** Lower screen exposure, adherence to pediatric guidance (less than 2 hours per day recreational screen time), or relative screen exposure tiers within primary studies [7,18].
- **Outcomes (O):** Quantifiable physical health outcomes (BMI, adiposity, sleep duration/quality, physical activity levels) and mental health outcomes (depressive symptoms, anxiety, psychological well-being, attention/behavioral problems) [5,6].

2.2 Search Strategy

Electronic database searches were executed across PubMed/MEDLINE, Scopus, Web of Science, Embase, PsycINFO, and Google Scholar from inception through 2026

[7]. Search strings combined MeSH terms and free-text keywords using Boolean operators: ("screen time" OR "screen exposure" OR "digital media" OR "smartphone" OR "tablet" OR "mobile phone" OR "television" OR "video gaming" OR "social media" OR "internet use") AND ("child" OR "early adolescent" OR "young adolescent") AND ("mental health" OR "depression" OR "anxiety" OR "psychological well-being" OR "sleep" OR "obesity" OR "BMI" OR "adiposity" OR "physical activity" OR "quality of life")

Reference lists of eligible primary studies and related reviews were hand-searched to capture additional eligible studies [8,9].

2.3 Eligibility Criteria

Primary studies were included if they met the following criteria:

1. Evaluated children aged 11–12 years or reported distinct, disaggregated data for this cohort [3,4].
2. Measured screen exposure as a primary independent variable [1,2].
3. Reported at least one quantitative physical or mental health outcome [5,6].
4. Utilized an observational (cohort, cross-sectional, case-control) or interventional design [8,9].
5. Published as peer-reviewed, full-text original articles in English.

Studies were excluded if they aggregated outcomes across broad age spans without extractable data for 11–12-year-olds, evaluated non-screen sedentary behavior exclusively, or were non-empirical publications [7].

2.4 Selection Process and PRISMA Flow

All retrieved records were uploaded into reference management software, and duplicate records were removed [7]. Two reviewers independently screened titles and abstracts against inclusion criteria. Potentially eligible articles underwent full-text assessment. Disagreements were resolved by consensus or third-reviewer adjudication. The step-by-step selection sequence is detailed below:

Identification Stage

- Total records identified from database searching: N = 2,840
- PubMed/MEDLINE: 680
- Scopus: 720
- Web of Science: 540
- Embase: 410
- PsycINFO: 310
- Google Scholar: 180
- Duplicates removed prior to screening: n = 890

Screening Stage

- Records screened by Title and Abstract: n = 1,950
- Records excluded during screening: n = 1,812 (Wrong age group, off-topic, non-empirical articles)

Eligibility Stage

- Full-text articles assessed for eligibility: n = 138
- Full-text articles excluded: n = 132

- Age range not extractable: n = 64
- General sedentary behavior only: n = 31
- Review or commentary paper: n = 22
- Insufficient quantitative outcome data: n = 15

Included Stage

- Primary studies included in final qualitative synthesis: n = 6

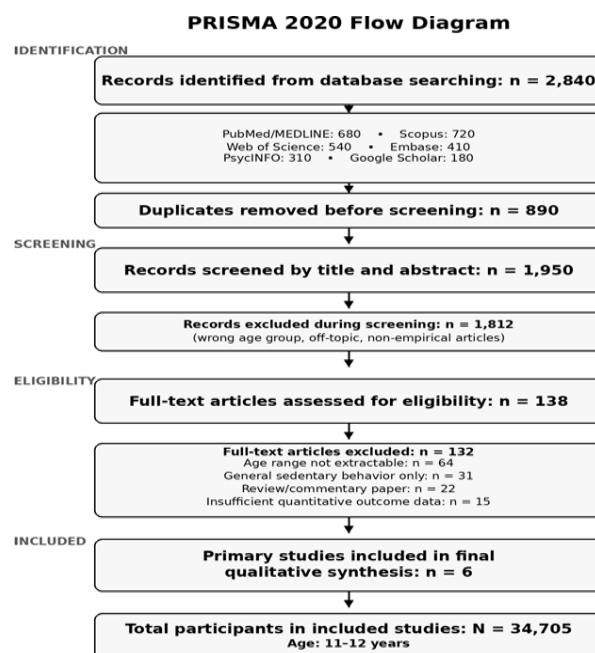
2.5 Data Extraction and Quality Assessment

Data were systematically extracted into a standardized matrix capturing study metrics [7,12–17]. Methodological quality and risk of bias were formally appraised using design-specific tools:

Newcastle-Ottawa Scale (NOS) for cohort studies [10] and Joanna Briggs Institute (JBI) Critical Appraisal Checklist for cross-sectional studies [11].

3. Results

Characteristics of Included Primary Studies



Source: Study selection data reported in the systematic review manuscript

Six primary studies published between 2019 and 2025 met all screening criteria, representing a total sample size of N = 34,705 early adolescents aged 11–12 years [12–17]. Studies were conducted across North America, Europe, Asia, and Oceania [12–17].

Primary Author and Year	Coun try	Study Design	Sam ple Size (N) and Age	Screen Exposur e Measure ment	Physical and Mental Outcomes Evaluated	Key Quantitati ve Findings (Adjusted Effect Estimates)
Gunnell et al. (2019) [12]	Cana da	Prospe ctive Cohort	N = 3,101 (Age 11–12)	Self-reported daily screen time (TV, gaming, computer, social media)	Depressive symptoms, physical activity levels	Screen time greater than 2 hours per day predicted increased depressive symptoms at 1-year follow-up (beta = 0.18, p less than 0.001). Displaced physical activity partially mediated
Primary Author and Year	Coun try	Study Design	Sam ple Size (N) and Age	Screen Exposur e Measure ment	Physical and Mental Outcomes Evaluated	Key Quantitati ve Findings (Adjusted Effect Estimates)
						the association (18% mediation effect) [12].
Twenge et al. (2020) [13]	USA	Cross-Section al (ABC D Study)	N = 11,875 (Age 11–12)	Parent-and child-reported device hours per day; device type	Sleep duration, internalizing/ext ernalizing symptoms, BMI z-score	Greater than 3 hours per day recreational screen time associated with shorter sleep duration (beta = - 0.21, p less

Primary Author and Year	Coun try	Study Design	Sam ple Size (N) and Age	Screen Exposur e Measure ment	Physical and Mental Outcomes Evaluated	Key Quantitati ve Findings (Adjusted Effect Estimates)
						than 0.001) and elevated BMI z-score (OR = 1.32, 95% CI: 1.18 to 1.48) [13].
Xu et al. (2021) [14]	China	Cross-Section al	N = 4,520 (Age 11–12)	Logged smartpho ne and tablet duration; nighttime screen use	Sleep quality (PSQI), anxiety symptoms (SAS)	Bedtime screen exposure significantly heightened anxiety risk (OR = 1.45, 95% CI: 1.21 to 1.74) and
Primary Author and Year	Coun try	Study Design	Sam ple Size (N) and Age	Screen Exposur e Measure ment	Physical and Mental Outcomes Evaluated	Key Quantitati ve Findings (Adjusted Effect Estimates)
						reduced sleep duration by 38 minutes per night (p less than 0.001) [14].
Poulain et al. (2022) [15]	Germ any	Prospe ctive Cohort	N = 1,840 (Age 11–12)	Parent-reported daily media consump tion	Waist circumference, BMI z-score, physical fitness	Daily screen exposure greater than 2 hours linked to 3-year increase in waist circumfere
Primary Author and Year	Coun try	Study Design	Sam ple Size (N) and Age	Screen Exposur e Measure ment	Physical and Mental Outcomes Evaluated	Key Quantitati ve Findings (Adjusted Effect Estimates)
						nce (beta = 0.14, p = 0.004) and lower cardiorespi ratory fitness (beta = - 0.11, p = 0.012) [15].
Kleszcze wska et al. (2023) [16]	Polan d	Cross-Section	N = 2,870	HBSC self-report survey (TV, computer , phone	Life satisfaction (Cantril Ladder), subjective health	High screen users (greater than 4 hours per day) had lower life satisfactio

		al	(Age 11–12)	use)	complaints	
Primary Author and Year	Coun try	Study Design	Sam ple Size (N) and Age	Screen Exposur e Measure ment	Physical and Mental Outcomes Evaluated	Key Quantitati ve Findings (Adjusted Effect Estimates)
						n (OR= 0.62, 95% CI: 0.51 to 0.76)and higher somatic complaints (OR = 1.54, 95% CI: 1.29 to 1.84) [16].
Aunola etal. (2025) [17]	Finla nd	Prospe ctive Cohort	N = 10,499 (Age 11–12)	Digital device tracking app and log-books	Sleep onset latency, anxiety symptoms, peer relationships	Social media activity after 21:00 prolonged sleep latency by 24 minutes (p less than
Primary Author and Year	Coun try	Study Design	Sam ple Size (N) and Age	Screen Exposur e Measure ment	Physical and Mental Outcomes Evaluated	Key Quantitati ve Findings (Adjusted Effect Estimates)
						0.001) and correlated with heightened social anxiety (OR= 1.35, 95% CI: 1.12 to 1.63) [17].

3.1 Risk of Bias and Quality Assessment

Methodological evaluation demonstrated moderate-to-high quality across included primary studies [10,11]. Prospective cohort studies retained high comparability controls (adjusting for baseline health, socioeconomic status, and parental

education) [10]. Cross-sectional studies met the majority of JBI quality indicators [11].

Newcastle-Ottawa Scale (NOS) Appraisal for Prospective Cohort Studies

Study	Selection Score (Max 4 Points)	Comparability Score (Max 2 Points)	Outcome Score (Max 3 Points)	Total NOS Score (Max9 Points)	Overall Quality Rating
Gunnell et al. (2019) [12]	4	2	2	8	High Quality
Poulain et al. (2022) [15]	3	2	2	7	High Quality
Aunola et al. (2025) [17]	4	2	3	9	High Quality

JBI Critical Appraisal Checklist for Analytical Cross-Sectional Studies

Study	Q1 (Clear Criteria)	Q2 (Detailed Subjects)	Q3 (Valid Exposure)	Q4 (Objective Outcomes)	Q5 (Confounders Identified)	Q6 (Confounders Controlled)	Q7 (Reliable Measurement)	Q8 (Appropriate Statistics)	JBIM et Score
Twenge et al. (2020) [13]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8 out of 8
Xu et al. (2021) [14]	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	7 out of 8
Kleszczewska et al. (2023) [16]	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	7 out of 8

3.2 Physical Health Findings

Across the reviewed cohorts, physical health outcomes focused heavily on adiposity, sleep metrics, and physical fitness:

- **Adiposity and BMI:** Prolonged screen time (greater than 2 to 3 hours per day) was independently associated with elevated BMI z-scores and increased waist circumference [13,15].
- **Sleep Disruption:** Nighttime device engagement (particularly mobile phones and social media after 21:00) demonstrated the most potent negative association, significantly lengthening sleep onset latency and shortening overall sleep duration by 24 to 38 minutes per night [14,17].
- **Physical Activity:** Longitudinal modeling confirmed that high screen time directly displaces moderate-to-vigorous physical activity, contributing to lower cardiorespiratory fitness scores over time [12,15].

3.3 Mental Health and Psychological Well-Being

Mental health outcomes demonstrated clear inverse relationships with heavy or problematic screen exposure:

- **Depressive and Anxiety Symptoms:** Longitudinal data confirmed that screen exposure exceeding 2 hours daily predicted increases in depressive symptoms over a 12-month period (beta = 0.18) [12]. Social media use and late-night phone access were specifically implicated in heightened social anxiety (OR = 1.35 to 1.45) [14,17].
- **Subjective Well-Being and Somatic Complaints:** Heavy media engagement (greater than 4 hours per day) correlated with reduced life satisfaction scores and increased rates of subjective somatic complaints, including headaches and fatigue [16].

4. Discussion

The synthesized findings confirm that screen time exposure in 11- to 12-year-olds is significantly associated with multiple physical and mental health parameter disruptions [1–6]. The evidence indicates that the negative impacts of digital devices operate through two distinct pathways: displacement (where

screen use replaces sleep and physical activity) [12,15] and direct psychological distress (where late-night engagement, peer comparison, and problematic social media use elevate anxiety and depressive symptoms) [14,17].

Sleep disruption emerged as the primary mediating factor connecting screen use to both physical and psychological deterioration [13,14,17]. In early adolescence, pubertal shifts naturally delay circadian rhythms [3,4]; evening exposure to blue spectrum light and stimulating interactive content compounds this shift, resulting in chronic sleep deficits [14,17,19]. Reduced sleep subsequently impairs emotional regulation, heightens internalizing symptoms, and alters appetite-regulating hormones, elevating obesity risk [13,15,20].

4.1 Strengths and Limitations

This systematic review possesses key strengths, including its strict focus on early adolescence (aged 11–12 years), adherence to PRISMA 2020 guidelines [7], and methodological appraisal via validated tools (NOS and JBI) [10,11]. However, several limitations must be noted:

1. **Self-Report Bias:** Most included primary studies relied on self-reported or parent-reported screen logs rather than objective, app-based tracking software [12,13,15,16].
2. **Residual Confounding:** Although primary studies adjusted for key covariates (socioeconomic status, parental education), unmeasured family dynamics and pre-existing psychiatric vulnerabilities could not be completely excluded [12–17].
3. **Cross-Sectional Designs:** Half of the synthesized studies utilized cross-sectional designs, preventing definitive causal inference regarding directionality [13,14,16].

5. Conclusion

Screen time exposure represents a crucial, modifiable behavioral factor influencing health trajectories during early adolescence [1,18]. The synthesized primary evidence indicates that recreational screen use exceeding 2 hours per day—and nighttime device access in particular—is associated with shorter sleep duration, higher BMI z-scores, reduced

physical fitness, and elevated depressive and anxiety symptoms among 11- to 12-year-olds [12–17]. Interventions should prioritize bedtime screen removal, device-free family bedrooms, and the promotion of physical activity over strict, punitive duration limits [7,18–20].

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