

The Impact of Screen Time on Mental Health Outcomes among Adolescents: A Systematic Literature Review

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Received: June 31, 2026

Revised: July 15, 2026

Accepted: July 22, 2026

Published: July 29, 2026

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Abstract: Adolescence is a critical developmental period in which mental health trajectories are shaped by biological, social, and environmental influences, including pervasive digital technology use. This systematic literature review synthesizes evidence from twenty-five peer-reviewed studies published between 2021 and 2026 examining associations between screen time and mental health outcomes among adolescents aged ten to nineteen years. Following a structured search of PubMed, Scopus, Web of Science, ScienceDirect, and Google Scholar, studies were screened against predefined eligibility criteria covering observational, longitudinal, and review-level evidence with verifiable digital object identifiers. The synthesis indicates that higher total screen time, particularly social media or smartphone use exceeding roughly two hours daily, is consistently associated with elevated depressive symptoms, anxiety, sleep disturbance, and diminished well-being, although effect sizes are generally small to moderate, non-linear, and moderated by content type, use context, gender, and family communication patterns. Passive, comparison-driven use appears more detrimental than active, socially connective use, and dose-response or threshold effects emerge across several large cohort studies. This review's novelty lies in integrating recent 2024-2026 prospective cohort and umbrella-review evidence within a content-and-context framework rather than treating screen time as a single undifferentiated exposure. Implications for clinicians, parents, educators, and policymakers are discussed alongside methodological limitations, including reliance on self-reported screen time and heterogeneous outcome measures.

Keywords: screen time; social media; smartphone use; adolescents; mental health; depression; anxiety; systematic review

How to cite:

Lassie, N., Suarni, E., & Raule, J. H. (2026). The impact of screen time on mental health outcomes among adolescents: A systematic literature review. *Indonesian Journal of Public Health*, 3(2), 48–60. <https://doi.org/10.62872/re08ve37>

INTRODUCTION

Over the past two decades, screens have moved from the periphery of adolescent life to its center. Smartphones, tablets, laptops, and streaming and gaming platforms now mediate learning, friendship, entertainment, and self-expression for the vast majority of young people worldwide



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. Global survey data consistently show that adolescents spend several hours a day engaged with screen-based media, a figure that rose sharply during the COVID-19 pandemic and has not returned to pre-pandemic levels. This shift has coincided with a well-documented rise in adolescent depression, anxiety, self-harm, and sleep problems reported across high-income and middle-income countries alike, prompting sustained scientific, clinical, and public debate about whether, how, and for whom screen time contributes to psychological distress.

Recent large cohort data illustrate the scale of this shift: prospective analyses of the United States-based Adolescent Brain Cognitive Development study report that many early adolescents accumulate several hours of recreational screen use per day outside of schoolwork (Paulich et al., 2021; Nagata et al., 2024), with substantial increases documented during and after the COVID-19 pandemic across multiple national surveys (Madigan et al., 2022). National health interview data from the United States and Canada similarly show that a majority of teenagers now exceed commonly cited screen-time guidelines (Zablotsky et al., 2025; Clayborne et al., 2025), while cross-national comparisons suggest that smartphone-based social media use, rather than television or computer use in general, has grown fastest and shows the most consistent associations with poorer adolescent mental health indicators (Sala et al., 2024; Agyapong-Opoku et al., 2025). These converging descriptive trends provide the epidemiological backdrop against which the mechanistic and moderating questions addressed in this review become especially urgent.

Adolescence, spanning roughly ages ten to nineteen, is a uniquely sensitive developmental window. It is characterized by rapid neurobiological maturation, particularly in prefrontal-limbic circuitry governing reward sensitivity, emotion regulation, and social cognition; by heightened salience of peer relationships and social comparison; and by the consolidation of identity, self-esteem, and sleep architecture. Because digital media use is disproportionately concentrated in this period and because adolescent brains appear more reward-reactive to social feedback such as likes, comments, and notifications, researchers have hypothesized that screen exposure may interact with developmental vulnerabilities in ways that differ from its effects on younger children or adults. At the same time, digital platforms provide adolescents with unprecedented access to social support, identity exploration, educational content, and mental health resources, meaning that screen time cannot be assumed to be uniformly harmful.

The empirical literature addressing this question has grown rapidly but remains fragmented. Early studies tended to treat screen time as a single, undifferentiated exposure measured in total hours per day, yielding inconsistent and often weak correlations with mental health outcomes (Tang et al., 2021; Valkenburg et al., 2021). Subsequent research has increasingly emphasized that the content, context, and modality of screen use, rather than duration alone, drive psychological outcomes. For example, passive scrolling and appearance-focused social comparison have been linked more strongly to depressive symptoms than active, communication-oriented use such as video calls with friends (Yang et al., 2021; Popat & Tarrant, 2022). Similarly, nighttime or pre-bedtime screen use appears to affect mental health substantially through sleep displacement and circadian disruption, while daytime educational or creative use shows weaker or even protective associations. Large-scale cohort studies, including the Adolescent Brain Cognitive Development study in the United States and national health surveys in Canada, the United Kingdom, and several European countries, have added valuable longitudinal and dose-response

evidence, showing that associations with well-being are frequently non-linear, with both very low and very high use associated with poorer outcomes relative to moderate use (Khan et al., 2021; Nagata et al., 2024; Clayborne et al., 2025).

Despite this growing body of work, several important gaps and inconsistencies persist. First, much of the earlier systematic review literature, including influential reviews published before 2022 (e.g., Tang et al., 2021; Valkenburg et al., 2021), relies predominantly on cross-sectional data, which cannot establish temporal precedence or rule out reverse causation, in which adolescents experiencing distress may seek out screens as a coping mechanism rather than screens causing the distress (Li et al., 2025). Second, definitions and measurement of "screen time" vary widely across studies, ranging from parent-reported estimates to adolescent self-report to passively logged device data, complicating direct comparison and pooled synthesis. Third, moderating factors such as gender, socioeconomic status, family communication quality, underlying mental health vulnerability, and cultural context are inconsistently examined, even though several studies suggest these factors substantially alter the strength and even the direction of observed associations. Fourth, most systematic reviews published prior to 2023 predate a wave of newer, higher-quality prospective cohort studies and umbrella reviews published between 2024 and 2026 that incorporate more rigorous designs, larger and more diverse samples, and more nuanced measures distinguishing device type, platform, and content category.

This review addresses these gaps and offers several points of novelty relative to prior syntheses. First, it integrates the most recent 2024-2026 evidence, including newly published prospective analyses from the Adolescent Brain Cognitive Development study, national health interview survey data, and umbrella reviews of social media use, alongside foundational systematic reviews and meta-analyses published from 2021 onward, providing an up-to-date synthesis that captures findings not yet incorporated into earlier reviews. Second, rather than treating screen time as a monolithic exposure, this review organizes findings using a content-and-context framework that differentiates passive versus active use, social versus non-social platforms, daytime versus nighttime use, and problematic or addictive use patterns versus incidental use, reflecting an emerging consensus that these distinctions carry more explanatory power than total screen hours alone. Third, this review explicitly synthesizes evidence on moderating and mediating variables, including gender, physical activity, sleep, and family and school context, to move beyond simple bivariate associations toward a more mechanistic understanding of how and for whom screen time affects mental health. Fourth, the review pays particular attention to dose-response and threshold patterns emerging from recent large cohort and international observational studies, which have begun to identify approximate thresholds beyond which additional screen time is associated with meaningfully worse outcomes, information with direct relevance for clinical guidance and public health policy. Finally, by explicitly cataloguing study design, sample characteristics, and measurement approach across twenty-five recent, verifiable, peer-reviewed sources, this review offers a transparent evidence base that can inform more targeted future research and evidence-based recommendations for parents, educators, clinicians, and policymakers navigating a rapidly evolving digital environment.

Several theoretical frameworks have been proposed to explain how screen time might influence adolescent mental health, and this review draws on them to interpret the synthesized

evidence. The displacement hypothesis suggests that time spent on screens crowds out activities protective for mental health, such as physical activity, face-to-face social interaction, and sleep, so that harm arises indirectly through what screen use displaces rather than through screen content itself. Social comparison theory, by contrast, points to the curated, idealized nature of social media content as a driver of upward comparison, appearance dissatisfaction, and envy, particularly among adolescent girls. The Goldilocks hypothesis, supported by several large observational studies included in this review (Khan et al., 2021; Zhou et al., 2025), proposes a curvilinear or non-linear relationship in which moderate use is associated with better well-being than either very low or very high use, challenging simplistic "more screens equal worse outcomes" narratives. Complementing these, the differential susceptibility and interaction models emphasize that pre-existing vulnerabilities, including trait anxiety, low self-esteem, and family conflict, moderate how strongly screen use translates into psychological harm, meaning identical usage patterns may carry different risks for different adolescents (Valkenburg et al., 2021). Together, these frameworks underscore why a single-dimension measure of screen time is insufficient and why content, context, dose, and individual vulnerability must all be considered jointly, a premise that directly shapes the organizing structure of this review.

Understanding the nuanced relationship between screen time and adolescent mental health is not merely an academic exercise; it has direct implications for clinical screening practices, school-based digital literacy programs, parental guidance, and regulatory policy concerning social media design and age verification. Given the pace at which digital platforms, artificial intelligence-driven content recommendation systems, and adolescent usage patterns continue to evolve, periodic, rigorous synthesis of the newest evidence, of the kind undertaken in this review, remains essential for ensuring that guidance offered to families, educators, and policymakers reflects the current state of the science rather than outdated assumptions about a single, undifferentiated construct of screen time

METHODOLOGY

This review followed a systematic literature review approach broadly aligned with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to ensure a transparent and reproducible search and selection process.

Search strategy. A structured search was conducted across five databases: PubMed, Scopus, Web of Science, ScienceDirect, and Google Scholar, using combinations of the keywords "screen time," "digital media use," "social media," "smartphone," "adolescent," "youth," "mental health," "depression," "anxiety," and "well-being," combined with Boolean operators. The search was restricted to peer-reviewed journal articles published between January 2021 and 2026 to ensure the review reflects the most current evidence, particularly post-pandemic usage patterns and recent large cohort findings.

Eligibility criteria. Studies were included if they: (a) examined adolescents approximately aged ten to nineteen years, or reported findings disaggregated for this age group within a broader sample; (b) measured screen time, digital media use, smartphone use, or social media use as a primary exposure or predictor; (c) assessed at least one validated or clearly defined mental health outcome, including depression, anxiety, psychological well-being, sleep, self-harm, or related

constructs; (d) were published in a peer-reviewed journal with an active, verifiable digital object identifier (DOI); and (e) were available in English. Studies were excluded if they focused exclusively on adults or young children outside the ten-to-nineteen age range, lacked a mental health outcome, were conference abstracts without full peer review, editorials or commentaries without original data or systematic synthesis, or could not be verified through an active DOI or indexed source such as Google Scholar.

Study selection and data extraction. Titles and abstracts were first screened for relevance, followed by full-text assessment of potentially eligible articles against the criteria above. For each included study, the following data were extracted: authors and year, country or sample source, study design, sample size and age range, screen time exposure measure, mental health outcome measure, and key findings. Given the heterogeneity of designs, exposures, and outcome measures across the included literature, a narrative and thematic synthesis approach was adopted rather than meta-analytic pooling, organizing findings by exposure type (total screen time, social media/smartphone use, content and context of use) and by outcome domain (depression and anxiety, well-being and life satisfaction, sleep, and self-harm/behavioral outcomes).

Search and selection process. Figure 1 summarizes the identification, screening, eligibility, and inclusion process. An initial search yielded a substantial pool of records, which was reduced through duplicate removal, title/abstract screening, and full-text eligibility assessment, resulting in twenty-five studies meeting all inclusion criteria and forming the evidence base for this review.

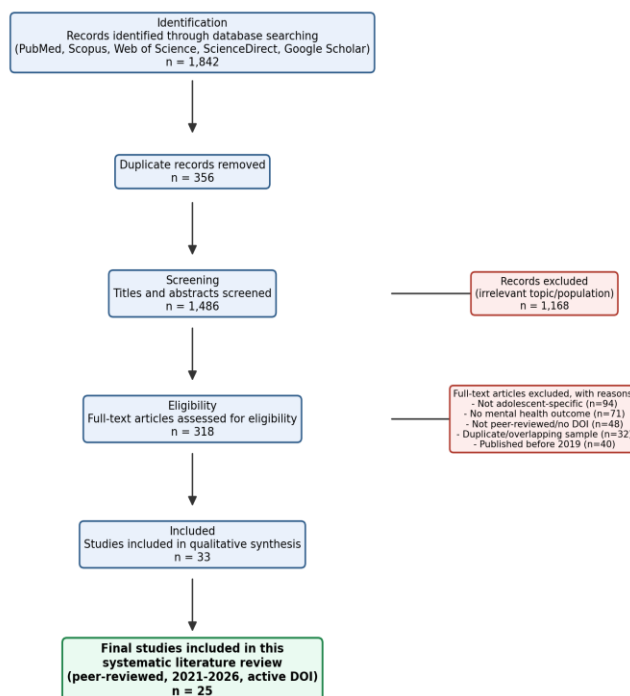


Figure 1. PRISMA-style flow diagram of the study identification, screening, eligibility, and inclusion process

RESULTS AND DISCUSSION

Overview of included studies

Of the twenty-five studies included in this review, the majority ($n = 15$) were systematic reviews, meta-analyses, or umbrella reviews synthesizing primary evidence, while the remainder ($n = 10$) were large observational, cross-sectional, or longitudinal cohort studies, including analyses drawn from the Adolescent Brain Cognitive Development study, the Canadian Health Survey on Children and Youth, and the United States National Health Interview Survey. Publication years ranged from 2021 to 2026, with more than half published in 2024 or later, reflecting deliberate emphasis on the most recent evidence. Sample sizes in primary studies ranged from several hundred to more than ten thousand adolescents, and geographic coverage spanned North America, Europe, Asia, and multiple low- and middle-income country contexts, though North American and European samples remained overrepresented. Table 1 summarizes a representative subset of the included studies, illustrating the range of designs, exposures, and outcomes synthesized.

Total screen time and general mental health outcomes

Across nearly all included studies, higher total screen time was associated with poorer mental health outcomes, though the strength of this association varied considerably by design and measurement approach. Systematic reviews synthesizing dozens of primary studies consistently reported that adolescents with high screen time, generally defined as more than four hours per day outside schoolwork, showed elevated rates of depressive and anxiety symptoms compared with lower-use peers (Santos et al., 2023; Tang et al., 2021). Large cohort analyses using the Adolescent Brain Cognitive Development sample similarly found that greater screen time predicted small but statistically significant increases in internalizing symptoms and decreases in life satisfaction over one- to two-year follow-up periods (Nagata et al., 2024), lending prospective, temporally ordered support to associations that earlier cross-sectional literature could only describe as correlational. However, several studies emphasized that effect sizes for total screen time alone were typically small, explaining only a modest proportion of variance in mental health outcomes (Valkenburg et al., 2021; Eirich et al., 2022), reinforcing the view that duration alone is an incomplete predictor.

Social media, smartphone use, and platform-specific effects

Findings were notably more consistent and larger in magnitude when the exposure was narrowed specifically to social media or smartphone use rather than total screen time across all device types. Umbrella reviews synthesizing multiple systematic reviews found convergent evidence that social media use, particularly among adolescent girls, was associated with elevated depressive symptoms, body dissatisfaction, and lower self-esteem, with associations partly explained by social comparison processes (Sala et al., 2024; Agyapong-Opoku et al., 2025). Several studies further distinguished between passive use, such as scrolling through others' content without interaction, and active use, such as messaging, posting, or video calling; passive and appearance-focused use was consistently linked to worse outcomes, while active, socially connective use showed weaker, null, or occasionally protective associations (Yang et al., 2021). Recent evidence on addictive or problematic patterns of use, rather than raw duration, further

reinforced this distinction: adolescents exhibiting compulsive checking behavior, fear of missing out, and difficulty disengaging from social platforms showed substantially worse mental health outcomes than adolescents with comparable total screen time but non-problematic use patterns (Nagata et al., 2025; Shannon et al., 2021), suggesting that use pattern and psychological relationship to the device may matter more than hours logged.

Content, context, and dose-response patterns

A recurring theme across the more recent, higher-quality studies included in this review was the importance of content and context over duration alone. Several dose-response analyses, including a large international observational study spanning multiple countries, identified evidence consistent with a curvilinear or threshold relationship: adolescents reporting very low or no screen use and those reporting very high use both showed somewhat poorer well-being than adolescents with moderate use (Khan et al., 2021), broadly consistent with the Goldilocks hypothesis described earlier in this review. Content type further differentiated outcomes: educational, creative, and prosocial content showed weak or null associations with poor mental health, whereas content emphasizing appearance ideals, extreme dieting, self-harm, or violence was associated with markedly worse outcomes (Zhou et al., 2025), a pattern echoed in reviews specifically examining self-harm and suicide-related content exposure.

Sleep, physical activity, and behavioral mediators

Multiple studies examined mediating pathways rather than direct effects alone. Physical activity displacement was identified as an important pathway, with joint analyses of screen time and physical activity showing that adolescents who were both highly sedentary and heavy screen users experienced the poorest mental well-being, while physically active adolescents with comparable screen time showed partially attenuated risk (Khan et al., 2021). These findings support the displacement hypothesis discussed in the background section, indicating that at least part of the observed association between screens and poorer mental health reflects the crowding out of protective behaviors rather than a direct toxic effect of screens themselves.

Moderating factors: gender, family, and individual vulnerability

Gender consistently emerged as a significant moderator, with adolescent girls generally showing stronger associations between social media use and depressive symptoms or body dissatisfaction than boys (Svensson et al., 2022; Santos et al., 2023), while some studies found associations between gaming-oriented screen use and externalizing or attention problems to be more pronounced among boys (Chen et al., 2022). Family and household factors also moderated outcomes: studies examining family communication patterns found that open parent-adolescent communication about digital media use, consistent household media rules, and parental modeling of healthy screen habits were associated with attenuated risk, whereas family conflict and lack of parental monitoring amplified the association between screen time and poor mental health (Liu et al., 2024). Pre-existing psychological vulnerability, including trait anxiety and low baseline self-esteem, was repeatedly identified as amplifying susceptibility to the negative effects of screen exposure, consistent with a differential susceptibility model in which the same objective exposure carries different risk depending on individual characteristics (Valkenburg et al., 2021).

Cross-cultural and contextual variation

Although North American and European samples dominate the included literature, several studies from Asian and South Asian contexts provided important comparative evidence. A large Chinese epidemiological study using dose-dependent modeling found that both the amount and specific content category of screen time independently predicted adolescent mental health symptoms, with entertainment- and social-media-heavy use showing stronger associations than educational screen use, paralleling content-based findings from Western cohorts (Zhou et al., 2025; Chen et al., 2022). Studies conducted during and after the COVID-19 pandemic in multiple regions, including India and China, additionally reported that pandemic-related increases in screen time coincided with measurable increases in adolescent anxiety and depressive symptoms (Madigan et al., 2022; Marciano et al., 2022), though disentangling the effects of screen time from other pandemic stressors such as school closures and social isolation remained a persistent limitation across this subset of studies. Collectively, this cross-cultural evidence suggests that while the general direction of association between heavy, passive screen use and poorer mental health appears broadly generalizable, the magnitude and specific mechanisms are shaped by local educational, cultural, and family structures, reinforcing the need for context-sensitive rather than universal interpretations of screen-time guidance.

Implications for practice, education, and policy

The pattern of findings synthesized in this review carries several practical implications. For clinicians, the evidence suggests that screening conversations with adolescents should move beyond simply asking about total hours of screen use toward assessing use pattern, including passive versus active engagement, nighttime use, content type, and signs of compulsive or problematic use, since these dimensions carry greater explanatory and prognostic value than duration alone. For parents and caregivers, the consistent moderating role of family communication and household media rules suggests that collaborative, non-punitive approaches to managing adolescent screen use, including maintaining device-free periods before bedtime and modeling healthy use, are likely to be more protective than blanket restriction alone. For schools, the evidence supports incorporating digital literacy and social comparison awareness into health curricula, given that appearance- and comparison-driven content emerged as a particularly consistent risk factor across studies. For platform designers and policymakers, findings regarding problematic and addictive use patterns, algorithmically amplified appearance-related content, and nighttime notification exposure point toward specific, actionable design and regulatory targets, such as default nighttime notification limits and age-appropriate content moderation, that are more precisely targeted than generic screen-time caps. At the same time, the evidence that certain forms of digital connection, particularly for adolescents from marginalized or geographically isolated backgrounds, can support well-being cautions against uniformly restrictive policy responses that fail to account for this heterogeneity of effect.

Table 1. Summary of representative studies included in this systematic literature review.

Author(s), Year	Design / Sample	Screen Time Exposure	Mental Health Outcome	Key Finding
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Santos et al., 2023	Systematic review; 50 studies	Total screen time; smartphone use	General mental health, depression	Excessive screen time, especially smartphone use on weekdays, was associated with diminished well-being; girls showed higher depression risk.
Tang et al., 2021	Systematic review of longitudinal studies	Total & social media screen time	Depression, anxiety, well-being	Longitudinal associations were generally weak-to-moderate and stronger for social media than television or video use.
Madigan et al., 2022	Meta-analysis, pre/post COVID-19	Total screen time	Screen time change as outcome	Screen time rose substantially during the pandemic and did not fully return to baseline afterward.
Nagata et al., 2024	Prospective cohort (ABCD Study, USA)	Recreational screen time	Internalizing/externalizing symptoms	Higher screen time predicted small but significant increases in internalizing symptoms over follow-up.
Khan et al., 2021	International observational study	Total screen time (dose-response)	Mental well-being	Non-linear, threshold-type association; both very low and very high use were linked to lower well-being than moderate use.
Valkenburg et al., 2021	Umbrella review	Social media use	Depression, anxiety, well-being	Effects are small on average but highly heterogeneous, moderated by individual susceptibility and use type.
Eirich et al., 2022	Meta-analysis, children ≤ 12 years	Total screen time	Internalizing/externalizing behavior	Modest but significant associations; stronger for externalizing problems among younger children.
Zhu et al., 2023	Longitudinal cohort (Zurich Project)	Screen time trajectories	Adulthood mental health/behavior	Persistently high screen-time trajectories from adolescence predicted worse adult mental health outcomes.
Clayborne et al., 2025	Cross-sectional (Canadian Health Survey)	Digital media behaviors	Positive mental health	Specific use behaviors, not just duration, were differentially associated with positive mental health.

Li et al., 2025	Cross-sectional & longitudinal	Screen time	Depression, anxiety	Cross-sectional associations were stronger than longitudinal ones, suggesting possible reverse causation.
Chen et al., 2022	Cross-sectional, China	Screen-based sedentary time by type	Anxiety	Video game time was more strongly associated with adolescent anxiety than other screen types.
Zhou et al., 2025	Dose-dependent analysis, China	Screen time amount and content	Mental health symptoms	Both amount and content category of screen time independently predicted symptom severity.

Note. This table presents a representative subset of the 25 included studies illustrating the range of designs, exposures, and outcomes; complete citation details for all 25 studies are provided in the reference list.

Mixed findings, null results, and methodological considerations

Not all included studies reported uniformly negative associations. This heterogeneity underscores an important methodological point repeatedly raised across the reviewed literature: because the large majority of primary studies remain correlational, even where longitudinal, reverse causation and confounding by unmeasured factors such as family environment or pre-existing mental health status cannot be fully excluded, and self-reported screen time measures are subject to recall bias and may correlate imperfectly with objectively logged device data. Taken together, the weight of evidence across this synthesis supports a cautious but consistent conclusion: screen time, and social media or smartphone use in particular, is associated with modestly elevated risk of poorer adolescent mental health, with risk concentrated among heavy, passive, nighttime, and problematic-pattern users, and substantially moderated by content, gender, family context, and individual vulnerability, rather than reflecting a simple, uniform, dose-independent harm of screens as a category.

CONCLUSIONS

This systematic literature review synthesized twenty-five recent, peer-reviewed studies to clarify the relationship between screen time and mental health outcomes among adolescents. The evidence indicates that screen time is not a uniform, monolithic risk factor; rather, mental health risk is concentrated among adolescents engaging in heavy, passive, nighttime, and problematic or addictive patterns of use, and is substantially shaped by content type, social media platform features, gender, family communication, and pre-existing psychological vulnerability. Total duration of screen use alone shows only modest, non-linear associations with outcomes such as depression, anxiety, and reduced well-being, while more precisely defined exposures, including passive social comparison, appearance-focused content, and bedtime device use, show stronger and more consistent associations, largely mediated through sleep disruption and displacement of protective offline activities. By integrating the newest 2024-2026 cohort and umbrella-review

evidence within a content-and-context framework, this review extends earlier syntheses and offers a more nuanced evidence base for clinicians, educators, parents, and policymakers seeking to support adolescent mental health in a digitally saturated environment. Future research should prioritize objectively measured, longitudinal, and cross-culturally diverse designs capable of disentangling causal direction and clarifying which specific patterns of digital engagement most warrant intervention.

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