The Longitudinal Effects of Social Media on Sleep Among Youth: A Scoping Review

Emma C. Sullivan[a], Bernadka Dubicka[bc], Hannah Kirsop[a], & Lisa-Marie Henderson[a]

[a]Department of Psychology, University of York, York, UK

[b]Division of Neuroscience, University of Manchester, Manchester, UK

[c]Hull and York Medical School, University of York, York, UK

Note this manuscript has not yet been peer reviewed.

Abstract

Social media has become an integral part of our everyday lives. Worldwide, almost 5 billion use social media sites. This marks an increase of over 200 million in the last year (Kemp, 2023). Although research has linked social media use to sleep disturbances, findings remain inconsistent, largely due to heterogeneity in measurement and reliance on self-report. Furthermore, research has assumed a causal pathway from social media use to subsequent sleep, but the preponderance of evidence is cross-sectional limiting directional claims. This scoping review synthesises longitudinal evidence published over the last five years that investigates the impact of social media use on downstream sleep in young people. The majority of studies provide at least some evidence of a negative impact of social media use on bedtime and sleep onset latency, particularly in relation to problematic social media use and excessive use near bedtime. However, the reliance on self-report and non-validated measures of both social media use and sleep limits the strength and breadth of conclusions. Future research should prioritise moving beyond frequency-based metrics of social media to explore how the content of social media use and times of day when used (i.e. nighttime) influences sleep quality longitudinally. Studies should also focus on identifying at-risk groups and account for confounding variables such as socio-economic status and mental health issues. Drawing on the extant evidence, we offer recommendations for clinicians to support a coordinated approach to reducing nighttime and problematic social media use, with the goal of improving sleep outcomes in youth.

Plain Language Summary

Social media is a major part of daily life for nearly 5 billion people worldwide, with over 200 million new users in the last year. While previous studies have suggested that social media use can disrupt sleep, results have been inconsistent, partly due to different methods and reliance of self-reports. Many studies also assume social media use causes sleep problems, but most research is cross-sectional, limiting conclusions about causality. This review looks at studies published in the last five years, focusing on the long-term effects of social media on sleep in young people. Most studies show that social media use, especially excessive use near bedtime and problematic use more generally, can negatively impact, including delaying sleep onset and increase the time it takes to fall asleep. However, the reliance on self-reports and unvalidated measures weakens the findings. Future research should move beyond tracking how often social

media is used and focus on factors like the type of content consumed and the timing of use, particularly at night. Studies should also consider factors like mental health and socioeconomic status that may influence sleep. Based on the current evidence, this review offers recommendations for clinicians to help reduce night and problematic social media use, in order to improve sleep outcomes for youth.

Keywords: Social media, sleep, longitudinal

Introduction

Social media has become an integral part of our everyday lives. Worldwide, almost 5 billion use social media sites. This marks an increase of over 200 million in the last year (Kemp, 2023). Social media use is also growing across generations: while the average adult spends nearly two hours per day on social media, younger users often engage for up to five hours daily. This increasing trend is also seen in younger age groups, with 38% of 5-7-year-olds now using social media sites or apps, up from 30% the previous year (Ofcom, 2024).

There is widespread concern about the implications of such pervasive social media use on youth. These concerns span multiple domains, including reduced physical activity, diminished face-to-face interactions, and more recently the potential for adverse effects on mental health, including sleep problems (Alonzo *et al.*, 2021). While some studies highlight potential harms, others suggest negligible effects on wellbeing (Orben, 2020), and even highlight benefits such as enhanced interpersonal communication and increased access to support (Lapierre and Zhao, 2022; Sala, Porcaro and Gómez, 2024).

Understanding the impact of social media use during adolescence is particularly important. Adolescence is characterised by biological, psychological and social changes, including the maturation of brain regions involved in emotion regulation, risk and reward-processing and social sensitivity (Casey, Getz and Galvan, 2008; Blakemore and Mills, 2014; Sala, Porcaro and Gómez, 2024). At the same time, sleep patterns undergo significant changes such as later bedtimes, shorter nocturnal sleep durations, and greater variability between school and weekend sleep schedules (Laberge *et al.*, 2001). These developmental changes often clash with early school start times (Carskadon, 2011), contributing to widespread sleep deprivation,

with an estimated 73% of adolescents not obtaining sufficient sleep (Eaton *et al.*, 2010; Jenco, 2018; Scott, Biello and Woods, 2019).

It is plausible that social media use may be exacerbating the adolescent sleep deprivation crisis. According to the displacement hypothesis (Cain and Gradisar, 2010), time spent engaging with social media may displace other healthy behaviours that safeguard mental health, or protect against reductions in wellbeing, such as sleep (Scott, Biello and Woods, 2019). Furthermore, reductions in sleep may also have downstream consequences for cognitive development, including executive functions such as working memory and inhibition (Friedman *et al.,* 2009), therefore sleep might be a critical causal mechanism through which social media use exerts harm (see Figure 1).

While research demonstrates an association between social media use and sleep, extant evidence remains inconsistent and is predominantly based on cross-sectional designs. Although such studies are useful for identifying correlations, they are limited in their ability to establish temporal relationships or causality (i.e. whether social media use leads to poorer sleep, or whether sleep difficulties drive increased social media use). In contrast, longitudinal studies are better positioned to clarify the direction and magnitude of these effects over time.

In this scoping review, we synthesise recent longitudinal research examining the relationship between social media use and sleep outcomes in children and adolescents. We also highlight underlying mechanisms proposed in the literature and conclude with practical recommendations for researchers and clinicians working in this rapidly evolving area.

Methods

Search Strategy

We searched the Web of Science, Scopus, PubMed, Medline, PsychInfo, CINAHL, and Embase electronic databases in March 2024, with an update in November 2024. We also sourced papers from other reviews and meta-analyses. Search terms such as 'Adolescent', 'Social media', 'Sleep', and 'Longitudinal' were used to identify relevant studies (see Supplementary Table S1 for the full search strategy for each database).

Inclusion and Exclusion Criteria

We included studies that have assessed the longitudinal impact of social media use (e.g. frequency, duration, timing, platforms used etc) on sleep outcomes (e.g. sleep duration, sleep latency, sleep quality etc). Although our age group of interest was youth aged 8-25 years, we included studies in which 50% of the sample were under 25 years. We only considered studies that were either peer-reviewed papers or systematic reviews and were published in the English language in or after 2019. Finally, experimental studies must include a longitudinal design with two or more time points, such as two-wave longitudinal studies.

Quality Appraisal

The quality of included studies was assessed using the Mixed Methods Appraisal Tool (MMAT; Hong *et al.*, 2018). While no studies were excluded based on their quality ratings, the appraisal was conducted to provide an overall sense of the strength and reliability of the literature included in the synthesis. MMAT was selected as an appropriate tool given that the included studies employed experimental designs that align with its criteria. Each study was independently evaluated by two reviewers (E.S and H.K), with any discrepancies resolved through discussion or, when necessary, by consulting a third reviewer.

Results

Summary of Reviews

Supplementary Table S2 summarises key attributes of identified reviews including author, number of longitudinal studies that examined the effects of social media on sleep included in the review, sample age range, pre registration status, definitions of social media use and sleep, main results, and strengths and limitations. In total, five reviews were identified: four systematic reviews (two of which included a meta-analysis) and one scoping review. Three of these focused more broadly on electronic/digital media use with social media use as a subcomponent and two focused on the impacts of social media use on sleep and mental health. Only one of these reviews focused specifically on longitudinal studies and their review encompassed "digital media" more broadly, with social media as one type of digital media activity (Pagano, Bacaro and Crocetti, 2023). Furthermore, given that intersection of social

media and sleep is a rapidly growing field of research, an updated review of longitudinal studies is required.

Overall, the reviews highlight that the majority of studies included demonstrate a negative impact of social media use on subsequent sleep, with a particular focus on how problematic social media use predicts sleep disturbances (Lund *et al.*, 2021; Dibben *et al.*, 2023; Pagano, Bacaro and Crocetti, 2023; Ahmed *et al.*, 2024; Yu *et al.*, 2024). Nonetheless, the reviews also report studies showing no significant impact of social media use on subsequent sleep, particularly when studies focus on whether the frequency of social media use impacts subsequent sleep. This inconsistency is attributed to substantial heterogeneity in how social media use and sleep are measured, with studies often focusing on specific aspects of social media use and sleep and frequently relying on self-report measures which are not always validated.

Summary of Longitudinal Studies

Table 1 summarises key attributes of selected studies including author, the country where the study took place, number of participants, sample age range, characteristics, pre-registration status, measures used to assess social media use and sleep, main results, and strengths and limitations. In total, we identified 12 longitudinal studies that examined the prospective relationship between social media use and sleep (see Figure 2 for an overview of the components of social media use and sleep assessed and measures used and Figure 3 for an overview of findings). Sample size across included studies ranged from 194 to 10010 and the age range of included study samples was between 10 and 29 years[1].

Measurement of Social Media Use.

Most studies assessed social media use through either self-developed questionnaire items (e.g. "*Have you neglected other activities to use social media?*") or standardised questionnaires such as the Bergen Social Media Addiction Scale (BSMAS; (Andreassen *et al.*, 2016)). Only a few studies employed more objective and reliable methods, such as digital recordings of

---

[1] Two of the included studies reported a mean age range of 21.8±1.2 years and 21.6±2.6 years therefore the estimate of the upper age range is an approximation using ±3 standard deviations to give an estimated range that covers approximately 99.7% of the values, assuming a normal distribution. Of those studies who reported the age range, the maximum age reported was 21 years.

smartphone interactions (e.g. (Dissing *et al.*, 2021)). The specific aspects of social media use varied across the 12 studies: five focused on problematic use (e.g. addictive or compulsive patterns), eight measured usage frequency and two explored other dimensions such as smartphone interaction metrics (e.g. call and text network size and interactions).

Measurement of Sleep.

Sleep was predominantly measured using self-developed questionnaire items (e.g. "*On average, how long does it take before you fall asleep?*") or standardised questionnaires such as the Insomnia Severity Index (ISI; (Bastien, Vallières and Morin, 2001). The studies examined various components of sleep: three focused on sleep quantity (sleep duration), eight on sleep quality (sleep onset latency, daytime sleepiness, sleep disturbance,), three on sleep timing (bedtimes), and two studies investigated insomnia symptom severity.

Negative Effects of Social Media on Sleep.

Eight of the 12 studies reported at least one negative impact of social media use on subsequent sleep. The most consistent finding was that problematic social media use (which includes addictive and compulsive use of social media) was associated with later bedtimes, greater insomnia symptom severity and poorer sleep quality (Raudsepp, 2019; Lin *et al.*, 2021; van den Eijnden *et al.*, 2021; Koban, Stevic and Matthes, 2023).

Higher frequency of social media use also predicted later bedtimes and shorter sleep duration (Viner *et al.*, 2019; Richardson *et al.*, 2021; van den Eijnden *et al.*, 2021). In particular, one study found that social media use when in bed prior to sleep was linked to greater caregiver-reported sleep disturbances and shorter self-reported sleep duration 1-year later (Nagata *et al.*, 2024). Relatedly, greater frequency of text and call use before bed prior to sleep, and greater frequency of interruptions from texts and calls after trying to go to sleep were associated with sleep disturbance and sleep duration. The authors proposed that engaging in social media activities (including calls and texts) at bedtime may interfere with sleep and reinforce habits characteristic of poor sleep hygiene. However, they also acknowledge that adolescents who have poorer sleep may be more likely to use social media for longer before bed.

Additionally, van der Schurr et al. (2019) found that higher levels of social media-related stress predicted longer sleep onset latency and greater daytime sleepiness, but only among female participants. Social media stress in this study was measured using a self-developed questionnaire including items such as: "*Have you felt tense or restless when you could not use social media?*". As a result, these findings are not directly comparable to studies examining other aspects of social media use, such as problematic or frequent use.

Together these studies present a reasonable body of evidence highlighting the negative impacts of social media use on sleep, particularly in relation to problematic social media use. While general usage frequency was also associated with poorer sleep outcomes, social media engagement before bedtime may be especially detrimental to healthy sleep patterns.

Positive Effects of Social Media on Sleep.

Two studies reported at least one positive association between social media use and sleep outcomes. Dissing et al. (Dissing *et al.*, 2021) collected continuous, objective data on call and text message interactions (e.g. call and text network size, frequency of call and text interactions and call duration) as well as Facebook activity (e.g. number of friends, frequency of likes and status updates), alongside self-reported measures of sleep disturbance. They found that larger communication networks (both in terms of text and call interactions and Facebook connections) were associated with a decrease in sleep disturbance from baseline to follow-up among males, but not females. The authors suggested that larger networks may reflect a more active social life, which could serve as a protective factor, potentially offsetting the negative effects of social media use on sleep quality. Importantly, this study also used objective recordings of smartphone activity, thereby avoiding the limitations associated with self-report measures. However, the data was collected in 2013, when texting and Facebook were the predominant social media platforms so these findings might not be generalisable to more recent social media metrics such as Instagram or TikTok followers. Moreover, this study measured daily smartphone interactions rather than smartphone interactions at specific times such as at nighttime which may explain the lack of negative effects on sleep disturbance.

In addition, although van der Schurr et al. (2019) found negative effects of social media stress on sleep onset latency and daytime sleepiness in females, they found that more frequent social media use predicted lower daytime sleepiness in males. The authors argue that this

gender difference may reflect different social media experiences: males may benefit from certain aspects of social media use, while females may be more susceptible to its negative consequences. Supporting this idea, McNee and Woods (McNee and Woods, 2019) found that for female users of Facebook and Instagram, social comparison was linked to increased night-time social media use and a higher tendency towards rumination (i.e. dwelling on negative thoughts). Moreover, rumination significantly mediated the relationship between social comparison behaviour and poor sleep. Other work has demonstrated that females tend to perceive social media as more stressful than males, which may contribute to gender differences in sleep outcomes (Thomée, Härenstam and Hagberg, 2011; Beyens, Frison and Eggermont, 2016).

No Effects of Social Media on Sleep.

Seven studies reported no significant effects of social media use on sleep outcomes. In several cases, frequency of social media use (which includes habitual use of social media) was not significantly associated with later bedtimes, sleep duration, sleep quality, daytime sleepiness or sleep disturbance (Richardson *et al.*, 2021; van den Eijnden *et al.*, 2021; Maksniemi *et al.*, 2022; Marciano *et al.*, 2022; Koban, Stevic and Matthes, 2023). For instance, Richardson et al. (Richardson *et al.*, 2021) found no association between time spent on social media and caregiver-reported sleep duration or daytime sleepiness on school nights. However, an association was observed with adolescent-reported sleep duration. This discrepancy may reflect weak agreement between caregiver and adolescent reports of sleep. Furthermore, Nagata et al. (Nagata *et al.*, 2024) found no significant association between frequency of interruptions from calls and texts after trying to go to sleep and caregiver reports of sleep disturbance.

Two studies also found no significant association between problematic social media use and sleep quality (van den Eijnden *et al.*, 2021; Li, Li and Luo, 2024). Li et al. (2024) examined the association between the intensity of social media use and sleep quality across four time points. They found that the intensity of social media use at the first time point did not significantly predict sleep quality at any subsequent measurement. These null findings imply that problematic social media use may exert stronger effects on bedtime and sleep quality metrics such as sleep onset latency but not perceived quality of sleep in general.

Dissing et al. (2021) also found no significant associations between frequency of call and text interactions, frequency of likes and status updates on Facebook and call duration on sleep disturbance.

Quality of Included Studies.

Supplementary Table S3 presents the MMAT ratings for the 12 included studies. In line with guidance from Hong et al. (2018), we did not calculate an overall score but instead report the results for each MMAT criterion descriptively. All studies were non-randomised pre-post design studies. Across the included studies, 16.6% had representative samples (in 66.6% of studies we were unable to identify whether sample was representative), all studies used appropriate measurement tools, and 66.6% had complete outcome data. For outcome completeness, we applied an attrition threshold of 20% for studies with follow-up periods under one year and 30% for those with longer follow-ups, as recommended by van Tulder et al. (2003) and Viswanathan and Berkman (2012). Additionally, 75% studies adequately accounted for at least one confounding factor (e.g. gender), and in all studies, the exposure (i..e social media) was measured as intended. Only one study met all five criterion and reported both negative and null associations between social media use and sleep outcomes (Nagata *et al.*, 2024).

Summary of Experience Sampling Studies

We also synthesised findings from studies using experience sampling methodology. Although these do not formally meet the criteria for traditional longitudinal designs, they examine whether social media use on one day predicted sleep outcomes that evening, thus providing valuable temporal insights. These findings are reported in the Supplementary materia

Table 1. Summary of longitudinal studies on social media use and sleep.

Study	Country of study	Sample character istics (age, % female)	Sample size across time	Pre Reg iste red (Y/ N)	Duratio n of study	Social media use measures	Sleep measures	Main findings	Strengths	Limitations
Problematic social media use										
van der Schuur et al (2019)	Netherlan ds	11-15, 49	T1: 1241, T2: 1216, T3: 1103	N	18 months	Social media stress (self-report questionnaire).	Sleep onset latency (self-report questionnaire). Daytime sleepiness (the Sleep Reduction Screening Questionnaire (SRSQ)).	Social media stress predicted longer sleep latency and higher daytime sleepiness, but only among females.	Large sample. Low attrition (12%). Standardised measure of daytime sleepiness.	Reliance on self-report measures of both social media use and sleep. Non-standardised measure of social media stress.
van der Eijnden et al (2021)	Netherlan ds	11-17, 45.4	T1: 2030; T2: 1422	N	1 year	Problematic social media use (Social Media Disorder scale (SMD)).	Sleep quality (5-item Groningen Sleep Quality Scale (GSKS)). Bedtime (self-report questionnaire)	Problematic social media use predicted later bedtime. Problematic social media use did not predict sleep quality.	Controlled for gender, age, educational level and outcome variables at T1. Standardised measures of problematic social media use and sleep quality.	Reliance on self-report measures of both social media use and sleep. High attrition (30%). Significant differences between participants who dropped out and participants who remained in the study limiting generalisability (e.g. participants who dropped out were more likely to report more frequent and problematic social media use, later

										bedtimes and poorer sleep quality at T1).
Lin et al (2021)	Iran	13-19, 55.4	T1: 1098 T3: 812	N	4 months	Addictive use of social media (Bergen Social Media Addiction Scale (BSMAS)).	Insomnia severity (Insomnia Severity Index (ISI)).	Addictive use of social media predicted greater insomnia severity.	Used validated measures of social media and sleep.	Reliance on self-report measures of both social media use and sleep. Did not control for other types of behavioural addictions which may influence relationships.
Koban et al (2023)	Germany	16-21, 54.81	T1: 978, T2: 415	N	4 months	Compulsive social media use (adapted 3-items from Lee's (2014) measure of compulsive usage of mobile phones).	Sleep quality (3 items based on the Pittsburgh Sleep Quality Index (PSQI)).	Compulsive social media use predicted poorer sleep quality.	Attempts to distinguish between "good" and "bad" social media habits.	Reliance on self-report measures of both social media use and sleep. High attrition (57%). Non-standardised measure of compulsive social media use and sleep quality (i.e. adapted scale). Measured compulsive social media use without reference to specific time (e.g. near bedtime) or activity (e.g. during important activities) related reference.

Raudsepp et al (2019)	Estonia	15.3±0.3, 46,6	T1: 249, T2: 223, T3 208	N	2 years	Problematic social media use (Bergen Social Media Addiction Scale (BSMAS)).	Insomnia severity (Insomnia Severity Index (ISI)).	Problematic social media use predicted greater insomnia severity.	Low attrition (17%). Standardised measures of social media use and sleep.	Reliance on self-report measures of both social media use and sleep. Small homogenous sample.
Li et al (2024)	China	21.8±1.2, 64.4	T1: 194, T2 = 194, T3 = 194	N	4 months	Intensity of social media use (used intensity of Social Networking Site Use Scale adapted from Facebook Intensity Scale).	Sleep quality (Chinese version of the PSQI).	Intensity of social networking site use at the initial time point did not significantly predict sleep quality at any of the other time points.	Standardised measures of social media use and sleep. No attrition as used full cohort.	Reliance on self-report measures of both social media use and sleep

Frequent social media use

van der Schuur et al (2019)	Netherlands	11-15, 49	T1: 1241, T2: 1216, T3: 1103,	N	18 months	Frequency of social media use (self-report questionnaire).	Sleep latency (self-report questionnaire). Daytime sleepiness (the Sleep Reduction Screening Questionnaire (SRSQ)).	Frequent social media use predicted less daytime sleepiness, only in males.	Large sample. Low attrition (12%). Standardised measure of daytime sleepiness.	Reliance on self-report measures of both social media use and sleep. Frequency of social media use examined with non-validated measures.
van der Eijnden et al (2021)	Netherlands	11-17, 45.4	T1: 2030; T2: 1422	N	1 year	Frequency of social media use (self-report questionnaire).	Sleep quality (5-item Groningen Sleep Quality Scale (GSKS). Time of going to bed (self-report questionnaire).	Frequent social media use predicted later bedtime. Frequent social media use did not predict sleep quality. When frequency of social media use and problematic social media use were tested in the same model,	Controlled for gender, age, educational level and outcome variables at T1. Standardised measures of problematic social media use and sleep quality	Reliance on self-report measures of both social media use and sleep. Non-standardised measure of frequency of social media use. High attrition (30%). Significant differences between participants who

							only frequent social media use predicted later bedtime.			dropped out and participants who remained in the study limiting generalisability (e.g. participants who dropped out were more likely to report more frequent and problematic social media use, later bedtimes and poorer sleep quality at T1).
Richardson et al (2021)	Australia	10-12, 49	T1: 528, T2: 502, T3: 478	N	3 years	Frequency of technology use (including browsing social media on school days)	School night sleep duration (self-report questionnaire). Caregiver-reported School night sleep duration. Daytime sleepiness (Pediatric Daytime Sleepiness Scale (PDSS)).	Frequent social media use predicted shorter adolescent-reported shorter sleep duration. Frequent social media use did not predict caregiver-reported sleep duration. Frequent social media use did not predict daytime sleepiness.	Comprehensive, multi-informant measure of sleep (adolescent and parent-reported). Low attrition (90%). Standardised measure of daytime sleepiness. Examined sleep on school days.	Reliance on self-report measures of both social media use and sleep. Non-standardised measure of frequency of social media use. Sample homogeneity in terms of age, and relationships only investigated in early adolescents.
Koban et al (2023)	Germany	16-21, 54.81	T1 = 978, T 2 = 415	N	4 months	Habitual social media use (adapted 3-items from Lee's (2014) measure of compulsive usage of mobile phones).	Sleep quality (3 items based on the Pittsburgh Sleep Quality Index (PSQI)).	Habitual social media use did not predict sleep quality.	Attempts to distinguish between "good" and "bad" social media habits.	Reliance on self-report measures of both social media use and sleep. High attrition (57%). Non-standardised measure of habitual and social media use

										and sleep quality (i.e. adapted scales). Measured habitual social media use without reference to specific time (e.g. near bedtime) or activity (e.g. during important activities) related reference.
Viner et al (2019)	UK	13-16	T1: 12866, T2: 11166, T3: 10010	N	3 years	Frequency of social media use (self-report questionnaire)	Sleep duration on weekdays (calculated from bedtime and wake time).	Frequent social media use (i.e. regularly/multiple times a day) predicted shorter sleep duration (< 8 hours a night).	Large representative sample.	Reliance on self-report measures of both social media use and sleep. Non-standardised measures of frequency of social media use. Did not report whether weekdays were during school or term time.
Maksnie mi et al (2022)	Finland	13-19, 65.7	426 (87.6% participa nts in at least four of the five follow-up timepoin ts)	N	6 years	Frequency of active social media use i.e. using social media to interact with others (the social-media-networking dimension of the Socio-Digital Participation Inventory).	Bedtime on school days (self-report questionnaire).	Frequent social media use did not predict bedtime.	Conducted over 6 years. Examined bedtime on school days. Low attrition (13%). Standardised measure of social media use. Measured specific type of social media use (active use).	Reliance on self-report measures of both social media use and sleep Non-standardised measure of sleep. Did not measure sleep latency, possible adolescents over-or-underestimated their reported bedtime.

										Lag was 1 year- little is known about developments within the year. Urban population with average financial status and standard level of school performance.
Marciano et al (2022)	Switzerland	14.45±0.5, 56.7	T1:1224 T2: 1088	N	18 months	Frequency of social media use (self-report questionnaire).	Sleep disturbance (3 items from the DSM-5 self-rated level 1 cross-cutting symptom measure for children).	Increased time spent on social media (from T1 to T2) did not predict sleep disturbance at T2.	Low attrition from T1 to T2. Non-standardised measure of sleep disturbance.	Reliance on self-report for both social media and sleep. Non-standardised measure of social media use. Conducted in the COVID-19 pandemic which was a unique context..
Nagata et al (2024)	USA	11-12, 48.4	T1: 9389 T2: 9389	N	1 year	Frequency of social media use (whilst in bed before sleep)	Caregiver-reported Sleep disturbance (Sleep disturbance scale for children (SDSC)). . Sleep duration (Munich Chronotype questionnaire).	Spending time on social media before going to sleep predicted greater sleep disturbance and shorter sleep duration.	Large demographically diverse sample. No attrition as used full cohort. Standardised measures of sleep.	Reliance on self-report for both social media and sleep. Caregivers reported sleep disturbance without self-report. with adolescent reports. Non-validated measures of social media use. Binary sleep disturbance outcome

									(yes/no) means possibility of misclassification.

Other (e.g. network size)

Dissing et al (2021)	Denmark	21.6±2.6, 23	T1: 816 (785 agreed to have Facebook data collected), T2: 589	N	4 months	Call and text network size (number of unique individuals with whom participants had interacted with using text messages or phone calls at least 3 times within 4 weeks- categorised in intervals of 10). Facebook network size (number of existing and obtained 'Facebook friends' during four-week observation period- cut-off of 150 connections). Frequency of call and text interactions (average number of incoming and outgoing calls and text messages per day during four-week observation; categorised in intervals of 10). Frequency of likes and status update interactions (number	Sleep disturbance (the Karolinska Sleep Questionnaire (KSQ)).	Larger text and call network size and Facebook network size predicted decreased sleep disturbance, but only among males. No significant associations between frequency of call and text interactions, facebook likes and status update interactions and total call duration and sleep disturbance.	Smartphone ran customised software which continuously recorded information on call and text message interactions as well as Facebook activity. Variety of different social media interactions types examined. Standardised measure of disturbed sleep.	Reliance on self-report for sleep. Interactions carried out on other platforms (e.g. email and messenger) not recorded. Conducted in 2013, assessed call, text messages and Facebook as the predominant interaction platforms so is likely outdated. Low response rate (29%) could have resulted in selection mechanism into the study Study population consisted of students at a higher education institute, the results may be less generalisable to socially disadvantaged young adults. Students given a smartphone in which

						of 'liking' and posting 'status' updates on Facebook; intervals of 2).				they inserted their personal SIM card; may not reflect personal smartphone usage.
						Total call duration (number of hours on calls during four-week observation; grouped into two-hour slots).				
Nagata et al (2024)	USA	11-12, 48.4	T1: 9389 T2: 9389	N	1 year	Frequency of call and text interactions (frequency of talking on the phone/texting whilst participants were in bed). Frequency of call and text interruptions (frequency of interruptions by phone calls, texts or emails after trying to sleep).	Caregiver-reported Sleep disturbance (Sleep disturbance scale for children (SDSC)). Sleep duration (Munich Chronotype questionnaire).	Frequency of call and text interactions before going to sleep predicted greater sleep disturbance and shorter sleep duration. Frequency of call and text interruptions after trying to go to sleep predicted shorter sleep duration but not sleep disturbance.	Large demographically diverse sample. No attrition as used full cohort. Standardised measures of sleep.	Reliance on self-report for both social media and sleep. Caregivers reported sleep disturbance without self-report. Non-validated measures of social media use. Binary sleep disturbance outcome (yes/no) means possibility of misclassification.

Discussion

Summary of Findings

This scoping review synthesises recent longitudinal research on the relationship between social media use and sleep outcomes in children and adolescents. Most studies suggest a negative association, with the strongest evidence pointing to problematic or excessive social media use as a key factor contributing to later sleep onset times and increased sleep onset latency. In particular, usage during bedtime hours consistently emerged as especially disruptive.

Despite these trends, the findings across studies remain inconsistent. While many studies reported at least one negative impact of social media use on sleep, they also found, amongst other studies, null or even positive associations. The inclusion of multiple social media and sleep measures, with only a subset showing significant results suggests a potential risk of false positives. This issue is further compounded by the absence of pre-registration in the included studies. Additionally, these inconsistencies are likely influenced by methodological limitations, including the reliance on self-report measures and the use of non-validated tools to assess both social media use and sleep, which complicates the interpretation of results.

Furthermore, several studies found gender effects for the association between social media use and sleep and suggested that females may be more negatively affected by the impact of social media use on sleep. These findings may be accounted for by the varying ways that males and females use social media, with females thought to use social media more for social comparison which is linked to rumination and poorer sleep (McNee and Woods, 2019) and also finding perceiving social media as more stressful (Thomée, Härenstam and Hagberg, 2011; Beyens, Frison and Eggermont, 2016). More recent work has emerged demonstrating that screen-sleep displacement leads to elevated symptoms of depression among females, but not males (Hökby *et al.*, 2025). It is important that future studies continue to account for gender effects to gain clearer insight into how the association between social media use and sleep differs across males and females and the mechanisms underlying this.

Proposed Mechanisms

Several mechanisms have been proposed to explain how social media use may impair sleep (Cain and Gradisar, 2010; Woods and Scott, 2019). First, social media engagement (especially before bed) can increase pre-sleep cognitive arousal. Adolescents may feel emotionally activated, either positively (e.g. excitement) or negatively (e.g. distress), by real-time interactions online, potentially leading to later bedtimes and delaying sleep onset.

Another key factor is the pervasive pressure to remain constantly connected and responsive, which can give rise to fear of missing out (FOMO). FOMO, a persistent anxiety about missing rewarding social experiences, is a well-established driver of social media use (Przybylski *et al.*, 2013). Research indicates that FOMO can directly elevate pre-sleep cognitive arousal, even independent of social media use itself (Scott and Woods, 2018). Highly invested social media users often report poorer sleep quality, possibly due to this persistent anxiety and difficulty disengaging at bedtime (Woods and Scott, 2016; Scott and Woods, 2018).

A second proposed mechanism relates to the timing and sensory effects of screen use. Social media use before sleep may directly display sleep time or interfere with the production of melatonin due to blue light exposure (Cain and Gradisar, 2010; Woods and Scott, 2019; Lin *et al.*, 2021). The displacement of sleep time can have downstream consequences for both mental health and cognitive performance (Friedman *et al.*, 2009; Scott, Biello and Woods, 2019). However, the specific effects of blue light remain contested, and further research is needed to draw firm conclusions (Silvani, Werder and Perret, 2022).

Some findings suggest that social media network size (as opposed to use) can be associated with better sleep. For example, Dissing et al. (2021) found that a larger call and text network size, and a larger number of Facebook friends was associated with fewer sleep disturbances over time in males but not females. However, this finding cannot be generalised to conclude that social media use is beneficial for sleep, as the concept of network size may be quite distinct from social media usage itself.

Recommendations for Future Research

Based on current findings, we propose several recommendations for future research. First and foremost, the measurement of sleep is based on self-report and includes non-validated items to

capture different aspects of sleep. Previous work demonstrates that self-reported sleep quality is often lower than that indicated by objective measures of sleep (Buysse *et al.*, 2008). Therefore, future studies should combine subjective and objective assessments of sleep, using wearables that track sleep alongside standardised questionnaires and sleep diaries.

Researchers should also explore what kind of content young people are engaging with and which platforms they are using. For example, Carter et al. (Carter *et al.*, 2024) found that individuals who reported problematic social media use were more likely to spend time on Instagram and TikTok, suggesting that platform-specific features may play a role in shaping sleep outcomes. It is also important to consider the emotional and contextual factors surrounding social media use. Some studies have shown that highly invested users tend to experience poorer sleep quality, potentially due to feelings of anxiety or FOMO as highlighted above (Woods and Scott, 2016; Scott and Woods, 2018). Understanding why young people use social media and how it makes them feel will provide a deeper understanding on its impact on sleep. To gain a deeper understanding of this, future work should involve young people in co-production to gain insight into these questions and how best to measure their social media activity.

Second, there is a need to explore how social media affects at-risk groups who may be particularly vulnerable to sleep disturbances. These groups include children with mental health conditions or neurodevelopmental disorders, children in care, LGBTQ+ youth, and preschool-aged children. Usage patterns are different in pre-school aged children, with 84% of preschoolers in the UK go online and the majority of this digital use is via a tablet. Therefore, it is important to understand how social media use in younger ages is associated with sleep outcomes.

Additionally, although we reviewed recent longitudinal studies, the directionality of the relationship between social media and sleep needs further investigation. It may be that poor sleep leads to increased social media use, particularly as a way of coping with being awake late at night, leading to a vicious cycle between social media use and sleep (Tavernier and Willoughby, 2014)). Li et al. (2024) also found evidence of this vicious cycle where sleep problems led to increased social media use and this, in turn, predicted further sleep problems, further supporting the argument for a more nuanced approach for understanding the social media use-sleep connection.

Furthermore, studies should capture casual associations between social media use and sleep over different longitudinal timescales. Methodologies such as experience sampling can be utilised to analyse how daily social media use predicts that nights' sleep outcomes and the combination of experience sampling with objective indicators of social media use with passive sensing and sleep with wearables is feasible.

Finally, it is critical that studies control for relevant confounding factors that may influence both social media use and sleep. These include, but are not limited to, SES, mental health issues (both in young people and their parents), income level, number of siblings, ethnicity and cultural background, and parenting styles. Accounting for these variables will help to strengthen the validity and interpretability of future research findings.

Recommendations for Clinicians

Clinicians should be aware of the growing body of evidence linking social media use (particularly problematic and nighttime use) to sleep difficulties in young people. When sleep problems are raised in clinical settings, especially in the context of co-occurring mental health concerns, it is important to include social media habits as part of the assessment and conversation.

Guidance on reducing nighttime social media use can be a helpful part of intervention strategies. Clinicians should recommend practical approaches such as enabling "do not disturb" mode, turning off notifications, or placing devices outside the bedroom at night. These strategies have been shown to reduce problematic social media use (Kalk *et al.*, 2024).

In addition, clinicians should promote family-based approaches that encourage healthy digital habits across all members of the household. When parents and siblings model balanced and mindful use of technology, it can reinforce healthier digital behaviours for children and adolescents.

Clinicians should also remain mindful of possible gender differences. Current research suggests that females may be more negatively affected by the impact of social media on sleep compared to males, and this should be taken into account when tailoring advice and interventions.

Finally, at a broader level, clinicians can play an important role in shaping community norms around sleep and digital wellbeing. They can encourage families, schools, and peer groups to adopt collective agreements such as device-free times in the evening or group efforts to silence notifications before bed which can foster healthier social media use and better sleep hygiene.

Conclusions

Despite the heterogeneity observed across recent studies, longitudinal evidence generally points to a predominantly negative impact of social media use on subsequent sleep, particular when it comes to problematic social media use and usage around bedtime. These findings underscore the limitations of examining social media use solely through the lens of frequency, as this approach fails to capture the complex and multifaceted relationship between social media use and sleep outcomes. Importantly much of the existing literature relies heavily on self-report and non-validated questionnaire items, limiting the strength of conclusions that can be drawn. To advance this rapidly evolving field, we have proposed several recommendations for researchers and clinicians aimed at improving methodological rigor and providing more robust evidence on the long-term effects of social media use on sleep.

References

Ahmed, O. *et al.* (2024) 'Social media use, mental health and sleep: A systematic review with meta-analyses', *Journal of Affective Disorders*, 367, pp. 701–712. Available at: https://doi.org/10.1016/j.jad.2024.08.193.

Alonzo, R. *et al.* (2021) 'Interplay between social media use, sleep quality, and mental health in youth: A systematic review', *Sleep Medicine Reviews*, 56, p. 101414. Available at: https://doi.org/10.1016/j.smrv.2020.101414.

Andreassen, C.S. *et al.* (2016) 'The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study', *Psychology of Addictive Behaviors*, 30(2), pp. 252–262. Available at: https://doi.org/10.1037/adb0000160.

Bastien, C.H., Vallières, A. and Morin, C.M. (2001) 'Validation of the Insomnia Severity Index as an outcome measure for insomnia research', *Sleep Medicine*, 2(4), pp. 297–307. Available at: https://doi.org/10.1016/S1389-9457(00)00065-4.

Beyens, I., Frison, E. and Eggermont, S. (2016) '"I don't want to miss a thing": Adolescents' fear of missing out and its relationship to adolescents' social needs, Facebook use, and Facebook related stress', *Computers in Human Behavior*, 64, pp. 1–8. Available at: https://doi.org/10.1016/j.chb.2016.05.083.

Blakemore, S.-J. and Mills, K.L. (2014) 'Is Adolescence a Sensitive Period for Sociocultural Processing?', *Annual Review of Psychology*, 65(Volume 65, 2014), pp. 187–207. Available at: https://doi.org/10.1146/annurev-psych-010213-115202.

Buysse, D.J. *et al.* (2008) 'Relationships Between the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and Clinical/Polysomnographic Measures in a Community Sample', *Journal of Clinical Sleep Medicine*, 04(06), pp. 563–571. Available at: https://doi.org/10.5664/jcsm.27351.

Cain, N. and Gradisar, M. (2010) 'Electronic media use and sleep in school-aged children and adolescents: A review', *Sleep Medicine*, 11(8), pp. 735–742. Available at: https://doi.org/10.1016/j.sleep.2010.02.006.

Carskadon, M.A. (2011) 'Sleep in Adolescents: The Perfect Storm', *Pediatric Clinics*, 58(3), pp. 637–647. Available at: https://doi.org/10.1016/j.pcl.2011.03.003.

Carter, B. *et al.* (2024) 'A multi-school study in England, to assess problematic smartphone usage and anxiety and depression', *Acta Paediatrica*, 113(10), pp. 2240–2248. Available at: https://doi.org/10.1111/apa.17317.

Casey, B.J., Getz, S. and Galvan, A. (2008) 'The adolescent brain', *Developmental Review*, 28(1), pp. 62–77. Available at: https://doi.org/10.1016/j.dr.2007.08.003.

Dibben, G.O. *et al.* (2023) 'Adolescents' interactive electronic device use, sleep and mental health: a systematic review of prospective studies', *Journal of Sleep Research*, 32(5), p. e13899. Available at: https://doi.org/10.1111/jsr.13899.

Dissing, A.S. *et al.* (2021) 'Smartphone interactions and mental well-being in young adults: A longitudinal study based on objective high-resolution smartphone data', *Scandinavian Journal of Public Health*, 49(3), pp. 325–332. Available at: https://doi.org/10.1177/1403494820920418.

Eaton, D.K. *et al.* (2010) 'Prevalence of Insufficient, Borderline, and Optimal Hours of Sleep Among High School Students – United States, 2007', *Journal of Adolescent Health*, 46(4), pp. 399–401. Available at: https://doi.org/10.1016/j.jadohealth.2009.10.011.

van den Eijnden, R.J.J.M. *et al.* (2021) 'Social Media Use and Adolescents' Sleep: A Longitudinal Study on the Protective Role of Parental Rules Regarding Internet Use before Sleep', *International Journal of Environmental Research and Public Health*, 18(3), p. 1346. Available at: https://doi.org/10.3390/ijerph18031346.

Friedman, N.P. *et al.* (2009) 'Individual Differences in Childhood Sleep Problems Predict Later Cognitive Executive Control', *Sleep*, 32(3), pp. 323–333. Available at: https://doi.org/10.1093/sleep/32.3.323.

Hökby, S. *et al.* (2025) 'Adolescents' screen time displaces multiple sleep pathways and elevates depressive symptoms over twelve months', *PLOS Global Public Health*, 5(4), p. e0004262. Available at: https://doi.org/10.1371/journal.pgph.0004262.

Hong, Q.N. *et al.* (2018) 'The Mixed Methods Appraisal Tool (MMAT) version 2018 for

information professionals and researchers', *Education for Information*, 34(4), pp. 285–291.

Jenco, M. (2018) 'Study: 73% of high school students not getting enough sleep'. Available at: https://publications.aap.org/aapnews/news/13792/Study-73-of-high-school-students-not-getting (Accessed: 12 November 2024).

Kalk, N.J. *et al.* (2024) 'Problematic smartphone use: What can teenagers and parents do to reduce use?', *Acta Paediatrica*, 113(10), pp. 2177–2179. Available at: https://doi.org/10.1111/apa.17365.

Kemp, S. (2023) *Digital 2023: Global Overview Report*, *DataReportal – Global Digital Insights*. Available at: https://datareportal.com/reports/digital-2023-global-overview-report (Accessed: 30 April 2025).

Koban, K., Stevic, A. and Matthes, J. (2023) 'A tale of two concepts: differential temporal predictions of habitual and compulsive social media use concerning connection overload and sleep quality', *Journal of Computer-Mediated Communication*, 28(2), p. zmac040. Available at: https://doi.org/10.1093/jcmc/zmac040.

Laberge, L. *et al.* (2001) 'Development of sleep patterns in early adolescence', *Journal of Sleep Research*, 10(1), pp. 59–67. Available at: https://doi.org/10.1046/j.1365-2869.2001.00242.x.

Lapierre, M.A. and Zhao, P. (2022) 'Smartphones and Social Support: Longitudinal Associations Between Smartphone Use and Types of Support', *Social Science Computer Review*, 40(3), pp. 831–843. Available at: https://doi.org/10.1177/0894439320988762.

Li, X., Li, H. and Luo, J. (2024) 'Cross-lagged panel analysis of the relationship between social networking sites use (SNSU) and sleep problems among university students', *BMC Public Health*, 24(1), p. 2283. Available at: https://doi.org/10.1186/s12889-024-19840-9.

Lin, C.-Y. *et al.* (2021) 'Longitudinal Relationships between Nomophobia, Addictive Use of Social Media, and Insomnia in Adolescents', *Healthcare*, 9(9), p. 1201. Available at: https://doi.org/10.3390/healthcare9091201.

Lund, L. *et al.* (2021) 'Electronic media use and sleep in children and adolescents in western countries: a systematic review', *BMC public health*, 21(1), p. 1598. Available at:

https://doi.org/10.1186/s12889-021-11640-9.

Maksniemi, E. *et al.* (2022) 'Intraindividual associations between active social media use, exhaustion, and bedtime vary according to age—A longitudinal study across adolescence', *Journal of Adolescence*, 94(3), pp. 401–414. Available at: https://doi.org/10.1002/jad.12033.

Marciano, L. *et al.* (2022) 'Screen time and adolescents' mental health before and after the COVID-19 lockdown in Switzerland: A natural experiment', *Frontiers in Psychiatry*, 13. Available at: https://doi.org/10.3389/fpsyt.2022.981881.

McNee, S. and Woods, H. (2019) 'Pre-sleep Cognitive Influence of Night-time Social Media Use and Social Comparison Behaviour in Young Women'. OSF. Available at: https://osf.io/n9txa (Accessed: 10 October 2024).

Nagata, J.M. *et al.* (2024) 'Bedtime Screen Use Behaviors and Sleep Outcomes in Early Adolescents: A Prospective Cohort Study', *Journal of Adolescent Health*, 75(4), pp. 650–655. Available at: https://doi.org/10.1016/j.jadohealth.2024.06.006.

Ofcom (2024) *Children and Parents: Media Use and Attitudes Report*. Available at: https://www.ofcom.org.uk/siteassets/resources/documents/research-and-data/media-literacy-research/children/children-media-use-and-attitudes-2024/childrens-media-literacy-report-2024.pdf?v=368229 (Accessed: 18 February 2025).

Orben, A. (2020) 'Teenagers, screens and social media: a narrative review of reviews and key studies', *Social Psychiatry and Psychiatric Epidemiology*, 55(4), pp. 407–414. Available at: https://doi.org/10.1007/s00127-019-01825-4.

Pagano, M., Bacaro, V. and Crocetti, E. (2023) '"Using digital media or sleeping … that is the question". A meta-analysis on digital media use and unhealthy sleep in adolescence', *Computers in Human Behavior*, 146, p. 107813. Available at: https://doi.org/10.1016/j.chb.2023.107813.

Przybylski, A.K. *et al.* (2013) 'Motivational, emotional, and behavioral correlates of fear of missing out', *Computers in Human Behavior*, 29(4), pp. 1841–1848. Available at: https://doi.org/10.1016/j.chb.2013.02.014.

Raudsepp, L. (2019) 'Brief report: Problematic social media use and sleep disturbances are

longitudinally associated with depressive symptoms in adolescents', *Journal of Adolescence*, 76, pp. 197–201. Available at: https://doi.org/10.1016/j.adolescence.2019.09.005.

Richardson, C. *et al.* (2021) 'A longitudinal investigation of sleep and technology use in early adolescence: does parental control of technology use protect adolescent sleep?', *Sleep Medicine*, 84, pp. 368–379. Available at: https://doi.org/10.1016/j.sleep.2021.06.003.

Sala, A., Porcaro, L. and Gómez, E. (2024) 'Social Media Use and adolescents' mental health and well-being: An umbrella review', *Computers in Human Behavior Reports*, 14, p. 100404. Available at: https://doi.org/10.1016/j.chbr.2024.100404.

Scott, H., Biello, S.M. and Woods, H.C. (2019) 'Social media use and adolescent sleep patterns: cross-sectional findings from the UK millennium cohort study', *BMJ Open*, 9(9), p. e031161. Available at: https://doi.org/10.1136/bmjopen-2019-031161.

Scott, H. and Woods, H.C. (2018) 'Fear of missing out and sleep: Cognitive behavioural factors in adolescents' nighttime social media use', *Journal of Adolescence*, 68(1), pp. 61–65. Available at: https://doi.org/10.1016/j.adolescence.2018.07.009.

Silvani, M.I., Werder, R. and Perret, C. (2022) 'The influence of blue light on sleep, performance and wellbeing in young adults: A systematic review', *Frontiers in Physiology*, 13. Available at: https://doi.org/10.3389/fphys.2022.943108.

Tavernier, R. and Willoughby, T. (2014) 'Sleep problems: predictor or outcome of media use among emerging adults at university?', *Journal of Sleep Research*, 23(4), pp. 389–396. Available at: https://doi.org/10.1111/jsr.12132.

Thomée, S., Härenstam, A. and Hagberg, M. (2011) 'Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults - a prospective cohort study', *BMC Public Health*, 11(1), p. 66. Available at: https://doi.org/10.1186/1471-2458-11-66.

van Tulder, M. *et al.* (2003) 'Updated method guidelines for systematic reviews in the cochrane collaboration back review group', *Spine*, 28(12), pp. 1290–1299. Available at: https://doi.org/10.1097/01.BRS.0000065484.95996.AF.

Van Der Schuur, W.A., Baumgartner, S.E. and Sumter, S.R. (2019) 'Social Media Use, Social Media Stress, and Sleep: Examining Cross-Sectional and Longitudinal Relationships

in Adolescents', *Health Communication*, 34(5), pp. 552–559. Available at:
https://doi.org/10.1080/10410236.2017.1422101.

Viner, R.M. *et al.* (2019) 'Roles of cyberbullying, sleep, and physical activity in mediating the effects of social media use on mental health and wellbeing among young people in England: a secondary analysis of longitudinal data', *The Lancet Child & Adolescent Health*, 3(10), pp. 685–696. Available at: https://doi.org/10.1016/S2352-4642(19)30186-5.

Viswanathan, M. and Berkman, N.D. (2012) 'Development of the RTI item bank on risk of bias and precision of observational studies', *Journal of Clinical Epidemiology*, 65(2), pp. 163–178. Available at: https://doi.org/10.1016/j.jclinepi.2011.05.008.

Woods, H.C. and Scott, H. (2016) '#Sleepyteens: Social media use in adolescence is associated with poor sleep quality, anxiety, depression and low self-esteem', *Journal of Adolescence*, 51, pp. 41–49. Available at: https://doi.org/10.1016/j.adolescence.2016.05.008.

Woods, H.C. and Scott, H. (2019) 'Merging the Biological and Cognitive Processes of Sleep and Screens', *Current Sleep Medicine Reports*, 5(3), pp. 150–155. Available at:
https://doi.org/10.1007/s40675-019-00149-8.

Yu, D.J. *et al.* (2024) 'The Impact of Social Media Use on Sleep and Mental Health in Youth: a Scoping Review', *Current Psychiatry Reports* [Preprint]. Available at:
https://doi.org/10.1007/s11920-024-01481-9.

The Longitudinal Effects of Social Media on Sleep Among Youth: A Scoping Review
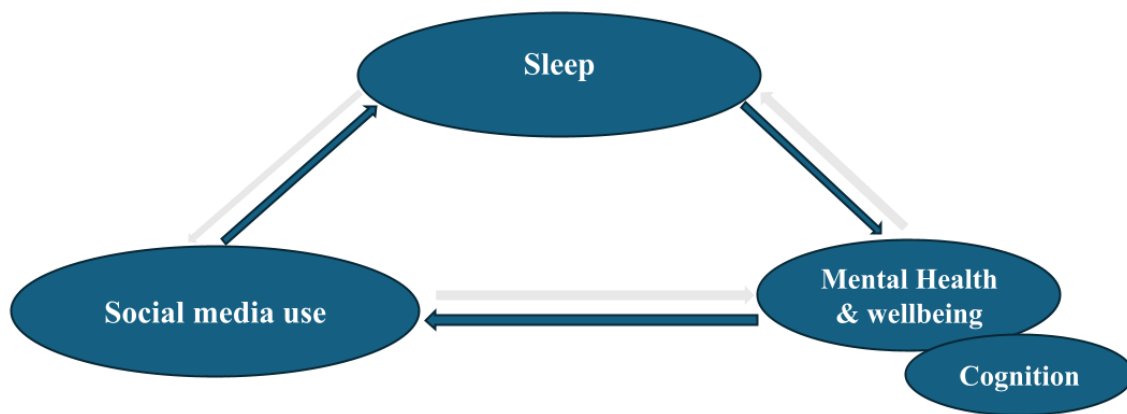
Figures

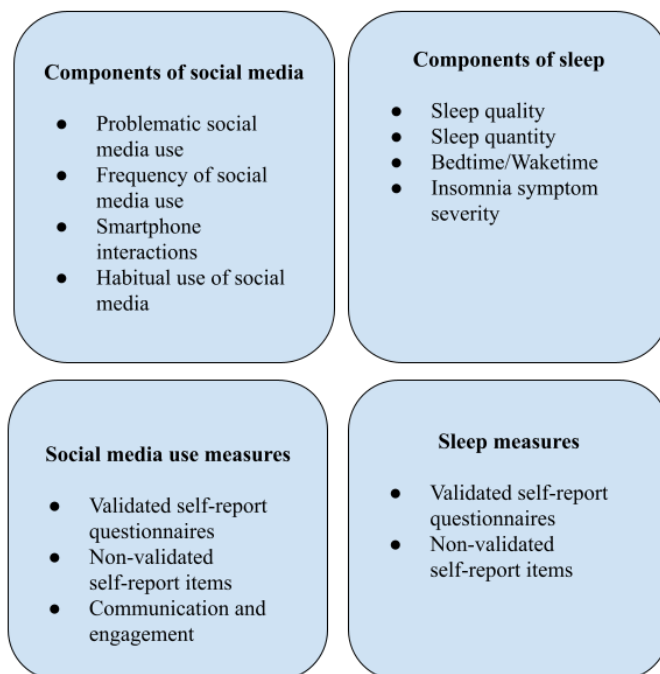Figure 1. Causal pathway linking sleep to mental health and cognition.

Figure 2. Components of social media use and sleep assessed, and measures used.
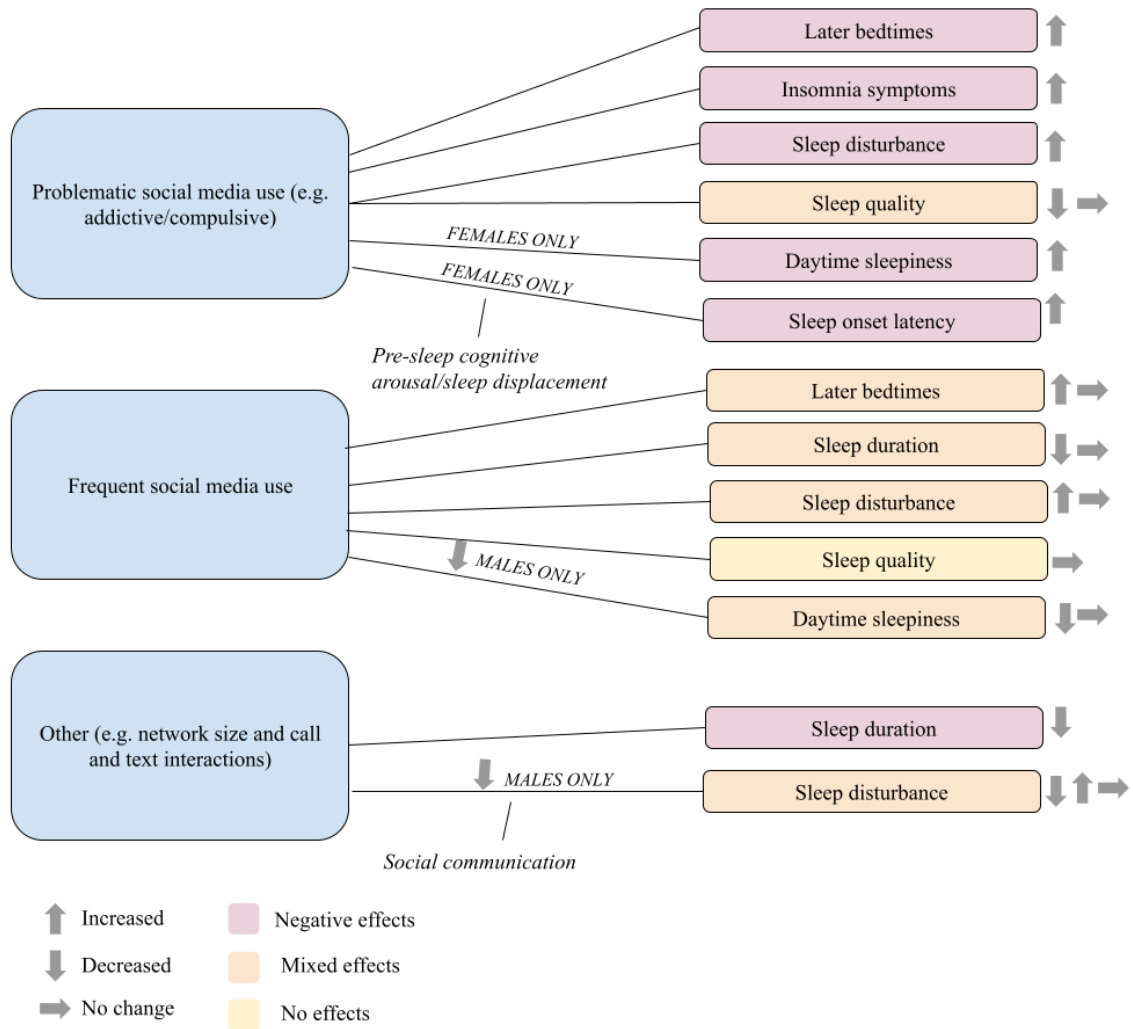
Figure 3. Overview of findings.

The Longitudinal Effects of Social Media on Sleep Among Youth: A Scoping Review

Supplementary material

S1. Search terms for scoping review

(("Adolescen*" OR "College student*" OR "Graduate student*" OR "High school student*" OR "Juvenile*" OR "Teen*" OR "Teenager*" OR "Undergraduate student*" OR "University student*" OR "Young adult*" OR "Young people" OR "Young person" OR "Youth*" OR "School child" OR "Schoolchild" OR "School-aged child" OR "Child*" OR "boys" OR "girls" OR "freshman" OR "freshmen" OR "generation Z" OR "millennial") AND ("online forum" or twitch OR "online friend" OR "net generation" OR "digital native" OR "generation z" OR "web 2.0" OR "social media" OR msn OR "online social network*" OR "social network* site" OR facebook OR twitter OR instagram OR myspace OR youtube OR tumblr OR reddit OR blog* OR snapchat OR tiktok OR wechat OR QQ OR QZone OR cyber* OR "online friend*" OR "online communit*" OR "e?communit*" OR blog* OR "chat room" OR "chatroom" OR cyber* OR tumblr OR pinterest OR reddit OR bebo OR "discussion forum" OR "online social support" OR "instant messag*" OR "text messag*" OR texting OR texted OR whatsapp OR sext*) AND ("Bedtime*" OR "Bedtime delay*" OR "Bedtime routine*" OR "Bedtime screen habit*" OR "Daytime functioning*" OR "Tiredness*" OR "Deep sleep*" OR "Night sleep*" OR "Reduced sleep duration*" OR "Rem, sleep*" OR "Shortened sleep duration*" OR "Sleep*" OR "Sleep cycle*" OR "Sleep deprivation*" OR "Sleep disturbance*" OR "Sleep duration*" OR "Sleep efficienc*" OR "Sleep environment*" OR "Sleep evaluation*" OR "Sleep fragmentation*" OR "Sleep habit*" OR "Sleep hygiene*" OR "Sleep initiation*" OR "Sleep impact*" OR "Sleep interruption*" OR "Sleep latenc*" OR "Sleep maintenance*" OR "Sleep outcome*" OR "Sleep pattern*" OR "Sleep quantit*" OR "Sleep qualit*" OR "Sleep rhythm*" OR "Sleep, slow-wave*" OR "Sleep stage*" OR "Sleep time*" OR "Sleep-wake cycle*" OR "Sleepiness*" OR "Total sleep" OR "Total sleep time*" OR "Rested*" OR "Well-rested*" OR "Refreshed*") AND (longitudinal or prospective OR "cohort stud*"))

Table S1. Search terms for each database

Database	Terms	Hits	Updated hits (Oct 2024)
Medline (via OCVID)	(("Adolescen*" or "College student*" or "Graduate student*" or "High school student*" or "Juvenile*" or "Teen*" or "Teenager*" or "Undergraduate student*" or "University student*" or "Young adult*" or "Young people" or "Young person" or "Youth*" or "School child" or "Schoolchild" or "School-aged child" or "Child*" or "boys" or "girls" or "freshman" or "freshmen" or "generation Z" or "millennial") and ("online forum" or twitch or "online friend" or "net generation" or "digital native" or "generation z" or "web 2.0" or "social media" or msn or "online social network*" or "social network* site" or facebook or twitter or instagram or myspace or youtube or tumblr or reddit or blog* or snapchat or tiktok or wechat or QQ or QZone or cyber* or "online friend*" or "online communit*" or "e?communit*" or blog* or "chat room" or "chatroom" or cyber* or tumblr or pinterest or reddit or bebo or "discussion forum" or "online social support" or "instant messag*" or "text messag*" or texting or texted or whatsapp or sext*) and ("Bedtime*" or "Bedtime delay*" or "Bedtime routine*" or "Bedtime screen habit*" or "Daytime functioning*" or "Tiredness*" or "Deep sleep*" or "Night sleep*" or "Reduced sleep duration*" or "Rem, sleep*" or "Shortened sleep duration*" or "Sleep*" or "Sleep cycle*" or "Sleep deprivation*" or "Sleep disturbance*" or "Sleep duration*" or "Sleep efficienc*" or "Sleep environment*" or "Sleep evaluation*" or "Sleep fragmentation*" or "Sleep habit*" or "Sleep hygiene*" or "Sleep initiation*" or "Sleep impact*" or "Sleep interruption*" or "Sleep latenc*" or "Sleep maintenance*" or "Sleep outcome*" or "Sleep pattern*" or "Sleep quantit*" or "Sleep qualit*" or "Sleep rhythm*" or "Sleep, slow-wave*" or "Sleep stage*" or "Sleep time*" or "Sleep-wake cycle*" or "Sleepiness*" or "Total sleep" or "Total sleep time*" or "Rested*" or "Well-rested*" or "Refreshed*") and (longitudinal or prospective or "cohort stud*")).ab,kf,ti.	72	83
PsychInfo	(("Adolescen*" or "College student*" or "Graduate student*" or "High school student*" or "Juvenile*" or "Teen*" or "Teenager*" or "Undergraduate student*" or "University student*" or "Young adult*" or "Young people" or "Young person" or "Youth*" or "School child" or "Schoolchild" or "School-aged child" or "Child*" or "boys" or "girls" or "freshman" or "freshmen" or "generation Z" or "millennial") and ("online forum" or twitch or "online friend" or "net generation" or "digital native" or "generation z" or "web 2.0" or "social media" or msn or "online social network*" or "social network* site" or facebook or twitter or instagram or myspace or youtube or tumblr or reddit or blog* or snapchat or tiktok or wechat or QQ or QZone or cyber* or "online friend*" or "online communit*" or "e?communit*" or blog* or "chat room" or "chatroom" or cyber* or tumblr or pinterest or reddit or bebo or "discussion forum" or "online social support" or "instant messag*" or "text messag*" or texting or texted or whatsapp or sext*) and ("Bedtime*" or "Bedtime delay*" or "Bedtime routine*" or "Bedtime screen habit*" or "Daytime functioning*" or "Tiredness*" or "Deep sleep*" or "Night sleep*" or "Reduced sleep duration*" or "Rem, sleep*" or "Shortened sleep duration*" or "Sleep*" or "Sleep cycle*" or "Sleep deprivation*" or "Sleep disturbance*" or "Sleep duration*" or "Sleep efficienc*" or "Sleep environment*" or "Sleep evaluation*" or "Sleep fragmentation*" or "Sleep habit*" or "Sleep hygiene*" or "Sleep initiation*" or "Sleep impact*" or "Sleep interruption*" or "Sleep latenc*" or "Sleep maintenance*" or "Sleep outcome*"	27	32

	or "Sleep pattern*" or "Sleep quantit*" or "Sleep qualit*" or "Sleep rhythm*" or "Sleep, slow-wave*" or "Sleep stage*" or "Sleep time*" or "Sleep-wake cycle*" or "Sleepiness*" or "Total sleep" or "Total sleep time*" or "Rested*" or "Well-rested*" or "Refreshed*") and (longitudinal or prospective or "cohort stud*")).ab,ti.		
Web of Science	TS=(((("Adolescen*" OR "College student*" OR "Graduate student*" OR "High school student*" OR "Juvenile*" OR "Teen*" OR "Teenager*" OR "Undergraduate student*" OR "University student*" OR "Young adult*" OR "Young people" OR "Young person" OR "Youth*" OR "School child" OR "Schoolchild" OR "School-aged child" OR "Child*" OR "boys" OR "girls" OR "freshman" OR "freshmen" OR "generation Z" OR "millennial") AND ("online forum" or twitch OR "online friend" OR "net generation" OR "digital native" OR "generation z" OR "web 2.0" OR "social media" OR msn OR "online social network*" OR "social network* site" OR facebook OR twitter OR instagram OR myspace OR youtube OR tumblr OR reddit OR blog* OR snapchat OR tiktok OR wechat OR QQ OR QZone OR cyber* OR "online friend*" OR "online communit*" OR "e?communit*" OR blog* OR "chat room" OR "chatroom" OR cyber* OR tumblr OR pinterest OR reddit OR bebo OR "discussion forum" OR "online social support" OR "instant messag*" OR "text messag*" OR texting OR texted OR whatsapp OR sext*) AND ("Bedtime*" OR "Bedtime delay*" OR "Bedtime routine*" OR "Bedtime screen habit*" OR "Daytime functioning*" OR "Tiredness*" OR "Deep sleep*" OR "Night sleep*" OR "Reduced sleep duration*" OR "Rem, sleep*" OR "Shortened sleep duration*" OR "Sleep*" OR "Sleep cycle*" OR "Sleep deprivation*" OR "Sleep disturbance*" OR "Sleep duration*" OR "Sleep efficienc*" OR "Sleep environment*" OR "Sleep evaluation*" OR "Sleep fragmentation*" OR "Sleep habit*" OR "Sleep hygiene*" OR "Sleep initiation*" OR "Sleep impact*" OR "Sleep interruption*" OR "Sleep latenc*" OR "Sleep maintenance*" OR "Sleep outcome*" OR "Sleep pattern*" OR "Sleep quantit*" OR "Sleep qualit*" OR "Sleep rhythm*" OR "Sleep, slow-wave*" OR "Sleep stage*" OR "Sleep time*" OR "Sleep-wake cycle*" OR "Sleepiness*" OR "Total sleep" OR "Total sleep time*" OR "Rested*" OR "Well-rested*" OR "Refreshed*") AND (longitudinal or prospective OR "cohort stud*")))	93	109
EMBASE	((("Adolescen*" or "College student*" or "Graduate student*" or "High school student*" or "Juvenile*" or "Teen*" or "Teenager*" or "Undergraduate student*" or "University student*" or "Young adult*" or "Young people" or "Young person" or "Youth*" or "School child" or "Schoolchild" or "School-aged child" or "Child*" or "boys" or "girls" or "freshman" or "freshmen" or "generation Z" or "millennial") and ("online forum" or twitch or "online friend" or "net generation" or "digital native" or "generation z" or "web 2.0" or "social media" or msn or "online social network*" or "social network* site" or facebook or twitter or instagram or myspace or youtube or tumblr or reddit or blog* or snapchat or tiktok or wechat or QQ or QZone or cyber* or "online friend*" or "online communit*" or "e?communit*" or blog* or "chat room" or "chatroom" or cyber* or tumblr or pinterest or reddit or bebo or "discussion forum" or "online social support" or "instant messag*" or "text messag*" or texting or texted or whatsapp or sext*) and ("Bedtime*" or "Bedtime delay*" or "Bedtime routine*" or "Bedtime screen habit*" or "Daytime functioning*" or "Tiredness*" or "Deep sleep*" or "Night sleep*" or "Reduced sleep duration*" or "Rem, sleep*" or "Shortened sleep duration*" or "Sleep*" or "Sleep cycle*" or "Sleep deprivation*" or "Sleep disturbance*" or "Sleep duration*" or "Sleep efficienc*" or "Sleep environment*" or "Sleep evaluation*" or "Sleep fragmentation*" or "Sleep habit*" or "Sleep hygiene*" or "Sleep initiation*" or "Sleep impact*" or "Sleep interruption*" or "Sleep latenc*" or "Sleep maintenance*" or "Sleep outcome*" or "Sleep pattern*" or "Sleep quantit*" or "Sleep qualit*" or "Sleep rhythm*" or "Sleep, slow-wave*" or "Sleep stage*"	88	102

	or "Sleep time*" or "Sleep-wake cycle*" or "Sleepiness*" or "Total sleep" or "Total sleep time*" or "Rested*" or "Well-rested*" or "Refreshed*") and (longitudinal or prospective or "cohort stud*")).ab,kf,ti.		
PubMed	(("Adolescen*"[Title/Abstract] OR "College student*"[Title/Abstract] OR "Graduate student*"[Title/Abstract] OR "High school student*"[Title/Abstract] OR "Juvenile*"[Title/Abstract] OR "Teen*"[Title/Abstract] OR "Teenager*"[Title/Abstract] OR "Undergraduate student*"[Title/Abstract] OR "University student*"[Title/Abstract] OR "Young adult*"[Title/Abstract] OR "Young people"[Title/Abstract] OR "Young person"[Title/Abstract] OR "Youth*"[Title/Abstract] OR "School child"[Title/Abstract] OR "Schoolchild"[Title/Abstract] OR "School-aged child"[Title/Abstract] OR "Child*"[Title/Abstract] OR "boys"[Title/Abstract] OR "girls"[Title/Abstract] OR "freshman"[Title/Abstract] OR "freshmen"[Title/Abstract] OR "generation Z"[Title/Abstract] OR "millennial"[Title/Abstract]) AND ("online forum"[Title/Abstract] OR twitch[Title/Abstract] OR "online friend"[Title/Abstract] OR "net generation"[Title/Abstract] OR "digital native"[Title/Abstract] OR "generation z"[Title/Abstract] OR "web 2.0"[Title/Abstract] OR "social media"[Title/Abstract] OR msn[Title/Abstract] OR "online social network*"[Title/Abstract] OR "social network* site"[Title/Abstract] OR facebook[Title/Abstract] OR twitter[Title/Abstract] OR instagram[Title/Abstract] OR myspace[Title/Abstract] OR youtube[Title/Abstract] OR tumblr[Title/Abstract] OR reddit[Title/Abstract] OR blog*[Title/Abstract] OR snapchat[Title/Abstract] OR tiktok[Title/Abstract] OR wechat[Title/Abstract] OR QQ[Title/Abstract] OR QZone[Title/Abstract] OR cyber*[Title/Abstract] OR "online friend*"[Title/Abstract] OR "online communit*"[Title/Abstract] OR "e?communit*"[Title/Abstract] OR blog*[Title/Abstract] OR "chat room"[Title/Abstract] OR "chatroom"[Title/Abstract] OR cyber*[Title/Abstract] OR tumblr[Title/Abstract] OR pinterest[Title/Abstract] OR reddit[Title/Abstract] OR bebo[Title/Abstract] OR "discussion forum"[Title/Abstract] OR "online social support"[Title/Abstract] OR "instant messag*"[Title/Abstract] OR "text messag*"[Title/Abstract] OR texting[Title/Abstract] OR texted[Title/Abstract] OR whatsapp[Title/Abstract] OR sext*[Title/Abstract]) AND ("Bedtime*"[Title/Abstract] OR "Bedtime delay*"[Title/Abstract] OR "Bedtime routine*"[Title/Abstract] OR "Bedtime screen habit*"[Title/Abstract] OR "Daytime functioning*"[Title/Abstract] OR "Tiredness*"[Title/Abstract] OR "Deep sleep*"[Title/Abstract] OR "Night sleep*"[Title/Abstract] OR "Reduced sleep duration*"[Title/Abstract] OR "Rem, sleep*"[Title/Abstract] OR "Shortened sleep duration*"[Title/Abstract] OR "Sleep*"[Title/Abstract] OR "Sleep cycle*"[Title/Abstract] OR "Sleep deprivation*"[Title/Abstract] OR "Sleep disturbance*"[Title/Abstract] OR "Sleep duration*"[Title/Abstract] OR "Sleep efficienc*"[Title/Abstract] OR "Sleep environment*"[Title/Abstract] OR "Sleep evaluation*"[Title/Abstract] OR "Sleep fragmentation*"[Title/Abstract] OR "Sleep habit*"[Title/Abstract] OR "Sleep hygiene*"[Title/Abstract] OR "Sleep initiation*"[Title/Abstract] OR "Sleep impact*"[Title/Abstract] OR "Sleep interruption*"[Title/Abstract] OR "Sleep latenc*"[Title/Abstract] OR "Sleep maintenance*"[Title/Abstract] OR "Sleep outcome*"[Title/Abstract] OR "Sleep pattern*"[Title/Abstract] OR "Sleep quantit*"[Title/Abstract] OR "Sleep qualit*"[Title/Abstract] OR "Sleep rhythm*"[Title/Abstract] OR "Sleep, slow-wave*"[Title/Abstract] OR "Sleep stage*"[Title/Abstract] OR "Sleep time*"[Title/Abstract] OR "Sleep-wake cycle*"[Title/Abstract] OR "Sleepiness*"[Title/Abstract] OR "Total sleep"[Title/Abstract] OR "Total sleep time*"[Title/Abstract] OR "Rested*"[Title/Abstract] OR "Well-rested*"[Title/Abstract] OR "Refreshed*"[Title/Abstract]) AND (longitudinal[Title/Abstract] OR prospective[Title/Abstract] OR "cohort stud*"[Title/Abstract]))	70	102

| Scopus | (TITLE-ABS-KEY ((("Adolescen*" OR "College student*" OR "Graduate student*" OR "High school student*" OR "Juvenile*" OR "Teen*" OR "Teenager*" OR "Undergraduate student*" OR "University student*" OR "Young adult*" OR "Young people" OR "Young person" OR "Youth*" OR "School child" OR "Schoolchild" OR "School-aged child" OR "Child*" OR "boys" OR "girls" OR "freshman" OR "freshmen" OR "generation Z" OR "millennial") AND ("online forum" OR twitch OR "online friend" OR "net generation" OR "digital native" OR "generation z" OR "web 2.0" OR "social media" OR msn OR "online social network*" OR "social network* site" OR facebook OR twitter OR instagram OR myspace OR youtube OR tumblr OR reddit OR blog* OR snapchat OR tiktok OR wechat OR qq OR qzone OR cyber* OR "online friend*" OR "online communit*" OR "e?communit*" OR blog* OR "chat room" OR "chatroom" OR cyber* OR tumblr OR pinterest OR reddit OR bebo OR "discussion forum" OR "online social support" OR "instant messag*" OR "text messag*" OR texting OR texted OR whatsapp OR sext*) AND ("Bedtime*" OR "Bedtime delay*" OR "Bedtime routine*" OR "Bedtime screen habit*" OR "Daytime functioning*" OR "Tiredness*" OR "Deep sleep*" OR "Night sleep*" OR "Reduced sleep duration*" OR "Rem, sleep*" OR "Shortened sleep duration*" OR "Sleep*" OR "Sleep cycle*" OR "Sleep deprivation*" OR "Sleep disturbance*" OR "Sleep duration*" OR "Sleep efficienc*" OR "Sleep environment*" OR "Sleep evaluation*" OR "Sleep fragmentation*" OR "Sleep habit*" OR "Sleep hygiene*" OR "Sleep initiation*" OR "Sleep impact*" OR "Sleep interruption*" OR "Sleep latenc*" OR "Sleep maintenance*" OR "Sleep outcome*" OR "Sleep pattern*" OR "Sleep quantit*" OR "Sleep qualit*" OR "Sleep rhythm*" OR "Sleep, slow-wave*" OR "Sleep stage*" OR "Sleep time*" OR "Sleep-wake cycle*" OR "Sleepiness*" OR "Total sleep" OR "Total sleep time*" OR "Rested*" OR "Well-rested*" OR "Refreshed*") AND (longitudinal OR prospective OR "cohort stud*"))) | 149 | 214 |

Table S2. Summary of reviews on social media use and sleep.

Study	# Longitudinal studies that examined sleep and social media use longitudinally, and covered years in search	Age range	Pre Registered (Y/N)	Definition of social media use	Definition of sleep	Main results and interpretations
Lund et al (2021)	1 study (2009-2019)	0-15 years	N	Defined electronic media use which encompassed social media use as the use of or access to electronic media devices; electronic media defined as mobile phones, televisions, touchscreen/tablets, computers or video game consoles.	Delayed bedtime/sleep onset latency, sleep quality, sleep duration, and daytime sleepiness.	Evidence for a negative impact of social media use on sleep: problematic social media use predicted poorer sleep quality, but only among females (see van der Schuur et al, 2019).
Dibben et al (2023)	2 studies (2007-2022)	10-19 years	N	Examined interactive electronic device use (IED; e.g., smartphones, tablets, laptops) and software accessible through mobile IEDs (e.g., social media, games, websites, messaging applications. Social media was defined as any interaction with a social media platform, whether actively or passively, at any time of day.	Sleep outcomes (e.g., sleep duration, sleeplessness, night awakenings, etc.).	Evidence for a negative impact of social media use on sleep: problematic social media use predicted poorer sleep quality, but only among females (see van der Schuur et al, 2019). Evidence for no impact of social media use on sleep: frequency of social media use did not predict bedtime on school days (see Maksniemi et al, 2022).
Yu et al (2024)	3 studies (2020-2023)	15-24 years	N	Social media use refers to the act of engaging with online platforms	Sleep quality, sleep duration, sleep displacement, bedtime,	Evidence for a negative impact of social media use on sleep: frequent use of social media predicted later bedtime and shorter

					specifically designed for social interaction.	sleep-onset latency, objective sleep data.	sleep duration (see van der Eijnden et al, 2021 and Richardson et al, 2021). Evidence for no impact of social media use on sleep: frequent use of social media did not predict sleep quality or daytime sleepiness (see van der Eijnden et al, 2021 and Richardson et al, 2021). Also, frequency of social media use did not predict bedtime on school days (see Maksniemi et al, 2022).
Pagano et al (2023)	4 studies (any time)	10-19 years	Y		Examined digital media use which included social media use. Social media are perceived as real relational contexts that overlap with offline life and are not simply vehicles of communication.	Studies that evaluated sleep with either objective (e.g. actigraphy, polysomnography) or subjective standardised measures (e.g. sleep diaries, questionnaires).	Evidence for a negative impact of social media use on sleep: problematic social media use predicted poorer sleep quality, but only among girls, and later bedtime (see van der Schuur et al, 2019 and van der Eijnden et al, 2021). Frequent use of social media also predicted later bedtime (van der Eijnden et al, 2021). Evidence for no impact of social media use on sleep: frequency of social media use did not predict bedtime on school days or sleep quality (see Maksniemi et al, 2022 and van der Eijnden et al, 2021). Problematic social media use also did not predict sleep quality (see van der Eijnden et al, 2021).
Ahmed et al (2024)	5 studies (any time)	0-25 years	Y		Social media use was assessed through usage duration, frequency, or questionnaires/scales. Problematic social media use was assessed using questionnaires/scales.	Sleep was assessed using questionnaires/scales.	Evidence for a negative impact of social media use/problematic social media use on sleep outcomes: problematic social media use predicted poorer sleep quality, but only among girls (see van der Schuur et al, 2019). Evidence for no impact of social media use/problematic social media use on sleep outcomes: both frequency of social media use and problematic social media use did not

predict sleep quality one year later (see van der Eijden et al, 2021).

S3. Mixed Methods Appraisal Tool Quantitative Checklist

Quantitative non-randomised studies

1. Are the participants representative of the target population?
2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?
3. Are there complete outcome data?
4. Are the confounders accounted for in the design and analysis
5. During the study period, is the intervention administered (or exposure occurred) as intended?

Yes, No, Can't Tell

Table S3. Quality appraisal ratings for each of the included studies.

Studies	Methodological quality criteria				
	1	**2**	**3**	**4**	**5**
Van der Schuur et al (2019)	Can't tell	Yes	Yes	Yes	Yes
Van der Eijnden et al (2021)	Can't tell	Yes	No	Yes	Yes
Lin et al (2021)	Can't tell	Yes	No	No	Yes
Koban et al (2023)	Yes	Yes	No	Yes	Yes
Raudsepp et al (2019)	Can't tell	Yes	Yes	No	Yes
Li et al (2024)	Can't tell	Yes	Yes	No	Yes

Richardson et al (2021)	Can't tell	Yes	Yes	Yes	Yes
Viner et al (2019)	Can't tell	Yes	Yes	Yes	Yes
Maksniemi et al (2022)	No	Yes	Yes	Yes	Yes
Marciano et al (2022)	No	Yes	Yes	Yes	Yes
Nagata et al (2024)	Yes	Yes	Yes	Yes	Yes
Dissing et al (2021)	Can't tell	Yes	No	Yes	Yes

S4. Summary of Findings from Experience Sampling Studies

Table S4 summarises key attributes of these studies, including author, country of study, number of participants, sample age range, characteristics, preregistration status, measures of social media use and sleep, main results, and strengths and limitations.

A total of seven experience sampling studies investigating the relationship between social media use and sleep were identified. All seven studies assessed the frequency of social media use, with three specifically focusing on usage in the hours before bed/sleep. Six studies relied on self-report measures of social media use (e.g. hours spent on social media each day), while one study objectively captured social media use using video cameras. Regarding sleep measurement, two studies used objective indicators (e.g. sleep duration and timing), four relied on self-report (e.g. sleep quality, duration and timing), and one combined both objective and subjective approaches.

Five of the seven studies found at least one negative association between social media use and subsequent sleep. For example, Hamilton et al. (2020) reported that greater social media use during the day predicted later bedtimes that evening. Similarly, Brosnan et al. (2024) found that social media use once in bed was associated with later shut-eye time (time when participants tried to go to sleep), later sleep onset and offset times, and increased shut-eye latency (time spent in bed before attempting to sleep). Li et al. (2024) also found that greater time actively spent on social media (but not time spent on social media use in general) was associated with later subjective sleep onset time. Moreover, Arya et al. (2024) reported that greater social media use within the previous 24 hours was associated with a higher likelihood of obtaining less than eight hours of sleep, even after adjusting for age, gender, BMI, and SES. However, it is worth noting that less than 8 hours of sleep may not be inherently problematic, depending on individuals' sleep needs. Das Friebel et al. (2020) also found that greater social media use in the hour before bed was associated with shorter subjective sleep duration but only among adolescents reporting higher levels of depressive symptoms, suggesting that individual vulnerabilities may moderate the impact of social media on sleep.

Interestingly, the same study (Das-Friebel *et al.*, 2020) reported a positive association between social media use and subsequent sleep, where greater bedtime social media use significantly predicted longer objective sleep duration that night. In this study, social media

use was defined as the total minutes spent communicating with others and using social media within the hour before bed. These findings align with Dissing et al. (2021), suggesting that studies focusing on communicating with family and friends within their definition of social media tend to find less detrimental effects on sleep.

Six of the seven studies reported at least one null finding. Across three studies, daytime social media use did not significantly predict self-reported or objectively measured sleep duration, sleep quality, or sleep timing (Hamilton *et al.*, 2020, 2023; Reichenberger *et al.*, 2024). Moreover, three studies found no effect of social media use 1-2 hours before bed on subjective and objective indicators of sleep, such as sleep duration and wake after sleep onset (Das-Friebel *et al.*, 2020; Brosnan *et al.*, 2024; Li *et al.*, 2024). Notably, Hamilton et al. (2020) found that adolescents at high risk of depression (based on parental history) were not more likely to use social media, nor did they show a stronger association between social media use and sleep. This contrasts with Das Friebel et al. (2020), who found effects among adolescents with elevated depressive symptoms. This discrepancy may be due to differing approaches in assessing depression risk, as Hamilton et al. (2020) assessed the risk of depression based on parental history, whereas Das Friebel et al. (2020) measured self-reported depressive symptoms in the adolescent population.

In sum, the findings from experience sampling studies suggest nuanced and context-dependent associations between social media use and sleep. While social media use appears to influence bedtime/sleep onset time and sleep onset latency, its impact on sleep duration and quality is less consistent. This may be partly explained by the predominantly university-based samples, who may be able to compensate for later bedtimes by sleeping in, resulting in minimal disruption to their overall sleep duration. Additionally, studies that define social media use to include communication with friends and family suggest that this type of usage is less harmful to sleep compared to other forms of social media use. It is also important to acknowledge that three of the included studies were conducted during the COVID-19 pandemic. The unique circumstances of this period may limit the generalisability of their findings to post-pandemic contexts.

Table S4. Summary of Experience Sampling Studies on Social Media Use and Sleep.

Study	Country/location of study	Sample characteristics (age, % female)	Sample size	Preregistered (Y/N)	Study type	Social media use measures	Sleep measures	Main findings	Strengths	Limitations
Frequent social media use										
Hamilton et al (2020)	US	9-13, 56	76	N	Experience sampling methodology: 9-days	Frequency of social media use (participants asked what they were doing when the phone beeped, including a social media use category; was reflected as a percentage of total experience sampling prompts).	Time of going to bed and waking up (self-report questionnaire). Sleep duration was calculated from the time of going to bed and waking up. Variability of sleep was calculated using the standard deviation for both sleep duration and time of going to bed.	Frequent social media use predicted later bedtime that night and more variability of sleep (both sleep duration and bedtime). No effect of frequent social media use on sleep duration. Youth at high risk for depression were not more likely to endorse social media use nor were they more likely to have stronger associations between social media use and sleep.	Real-time measurements of social media use. Exploratory analysis with vulnerable groups (high risk of depression). Supplementary analysis examining by week and weekend days (results are the same).	Reliance on self-report for both social media and sleep. Study was conducted in 2015 when social media engagement was largely different from now. Provided participants with smartphones for their personal use during the study, which may have altered their engagement.
Das-Friebel et al (2020)	UK	18-22, 65.3	101	Y	Experience sampling method	Frequency of social media use (participants asked to indicate specifically with regard to the last	Sleep duration (self-report questionnaire and actigraphy measured).	Increased bedtime social media use did not predict subjective sleep duration, sleep satisfaction or	Measured sleep using objective and subjective measures.	Reliance on self-report for social media. Retrospective assessment of bedtime

					Methodology	Social Media Measure	Sleep Measure	Findings	Strengths	Limitations
					ology: 14-days	hour before sleep, how many minutes they had spent engaging in (a) communicating with others via text, chat or phone/video, (b) using social media sites or applications. Total use was calculated by adding together responses to these two items.	Sleep satisfaction (self-report questionnaire). Sleep efficiency (actigraphy).	objectively measured sleep efficiency, but did predict longer objective sleep duration. In those with higher levels of depressive symptoms, higher levels of bedtime social media use were negatively associated with subjective sleep duration.	Exploratory analysis with vulnerable groups (high depressive symptoms). Extensive experience sampling length (14 days). Study was pre-registered.	social media use (following morning) may have led to underestimations of actual use. Participants were self-selected, so not clear whether the sample is representative of the university sample (depression symptoms higher than expected).
Hamilton et al (2023)	US	12-17, 100	93	N	Experience sampling methodology: 10-days	Frequency of social media use (participants indicated time spent using social media and related social technologies each day).	Time to bed and wake up time (self-report questionnaire). Sleep duration (estimated using time to bed and wake up times). Sleep quality (self-report questionnaire).	Frequent social media use did not predict that night's sleep duration, timing or quality.	Used daily diaries to examine social media use day-to-day rather than relying on a single assessment point. Two-thirds of the sample were at high temperamental risk of depression and anxiety	Reliance on self-report for both social media and sleep. Prior night's sleep assessed in the evening rather than morning, which may influence the accuracy of self-reported sleep. Sample was predominantly white and only included adolescent girls. Measure social media and sleep during the COVID-19 pandemic which may limit

										generalisation as unique context
Reich enberg er et al (2024)	US	15.4±0.5, 53	475	N	Experie nce samplin g method ology: 3 days	Frequency of social media use (adolescents asked how many hours they spent communicating with friends by email, instant messaging, texting, or through social media sites that day).	Sleep onset and offset (actigraphy). Sleep midpoint (actigraphy). Sleep duration (actigraphy).	Frequent social media use did not predict sleep onset, offset, midpoint or duration.	Examined multiple sleep timing outcomes (i.e. sleep onset, midpoint, and offset). Objective assessments of sleep. Controlled for school nights, bedtime routine and socioeconomic factors.	Reliance on self-report for social media measure. Data collected between 2014-2016 when social media engagement was largely different from now.
Arya et al (2024)	Austra lia	13-19, 80%	1295	N	Experie nce samplin g method ology: 7-weeks	Frequency of social media use (participants asked to indicate how many hours they spent on social media in the last 24-hours).	Sleep duration (self-report questionnaire).	Higher levels of social media use were associated with a sleep duration of less than 8-hours.	Extensive experience sampling length (7-weeks). Association held when controlling for gender, age, BMI and SES.	Reliance on self-report for both social media and sleep. High attrition rate potential source of bias (just over 25% of those recruited responded to at least one follow-up EMA). Follow-up period coincided with the initial period of the COVID-19 pandemic which may limit generalisation as unique context.
Brosn an et al (2024)	New Zealan d	11-14.9, 40.5	79	N	Experie nce samplin g	Frequency of social media use (obtained from wearable and stationary cameras.	Bedtime and shut-eye time (time when participants tried to go	In the 2 hours before bed, on the nights when social media was used (vs not used) no	Short experience sampling period (4 days).	Labour-intensive manual coding of video data.

method ology: 4 nights	Recorded screen time for 2 hours before bedtime until youth attempted to sleep and coded for screen activities, including social media use).	to sleep) (determined from video data). Shut-eye latency (difference between bedtime and first shut-eye time from video data) Sleep onset (start of first 15 minutes of continuous sleep), and sleep offset (last 15 minutes of continuous sleep) (actigraphy). Sleep latency (difference between flagged shut-eye time from video data until sleep onset from actigraphy). Wake after sleep onset (actigraphy). Sleep duration (number of minutes from sleep onset to sleep offset minus number of minutes awake after sleep onset) (actigraphy).	significant difference on any of the sleep measures. On the nights when social media was used once in bed (vs not used) significant difference in shut-eye time, sleep onset time, sleep offset time, and increased shut-eye latency. No significant differences in sleep duration, wake after sleep onset, bedtime, or sleep latency.	Objective measures of both social media use and sleep. Sample diverse in terms of gender and ethnicity. High completion rate (only 2 participants withdrew, and 4 did not have sufficient data).	Potential demand effects as participants were aware they were being recorded.

| Li et al (2024) | China | 20.57± 0.99, 30.7 | 88 | N | Experiencing sampling methodology: 7-days | Frequency of social media use (asked how many minutes spent on social media in the 2 hours preceding bedtime the previous night, also measured time actively spent on social media. | Time to bed, sleep onset time, sleep offset time, time out of bed (self-report questionnaire).

Sleep onset latency (self-report questionnaire).

Number and duration of nocturnal awakenings (self-report questionnaire).

Sleep offset time, time out of bed (self-report questionnaire).

Sleep quality (self-report questionnaire). | Higher levels of social media use before bed not associated with any of the sleep measures.

Higher levels of active social media use before bed associated with later sleep onset time that evening but not other sleep measures. | Specific analysis of active social media use (where effects on bedtime were found). | Reliance on self-report measures for social media use and sleep.

Frequent exposure to COVID-19 related news may have significantly influenced sleep patterns during this period, limiting generalisability as unique context. |