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Screen exposure, mental health, and socioemotional development in children and adolescents: an umbrella review

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Systematic Review

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Abstract

Aim

To synthesize and critically appraise systematic-review and meta-analytic evidence on associations between screen exposure and mental health and socioemotional outcomes in people aged 0–18 years.

Methods

We conducted a PRISMA 2020-compliant umbrella review registered in PROSPERO (CRD420261460684). PubMed/MEDLINE, Scopus, Epistemonikos, and the Cochrane Library were searched for English-language systematic reviews and meta-analyses published from January 2020 through December 2025. Two reviewers independently screened records and extracted data. Findings were synthesized narratively. Methodological quality was appraised with AMSTAR 2, certainty was explored with review-level GRADE domains, and primary-study overlap was estimated with the corrected covered area (CCA).

Results

Fourteen reviews were included from 710 records. Greater screen exposure was associated with internalizing and externalizing problems, hyperactivity, socioemotional difficulties, sleep disturbance, and poorer psychosocial well-being. Associations were generally small and more consistent for problematic use than for duration alone. In children younger than five years, pooled associations were reported for socioemotional difficulties (odds ratio [OR] 1.24), hyperactivity (OR 1.39), and emotional problems (OR 1.21). Longitudinal evidence suggested small bidirectional associations (β = 0.06). Among 11 reviews with verifiable primary-study lists, 273 occurrences represented 220 unique studies (partial CCA 2.41%, slight overlap). No review had high methodological confidence; certainty was predominantly low or very low.

Conclusion

Screen exposure is associated with less favorable mental health and socioemotional outcomes, but current evidence does not establish direct causality. Content, context, purpose, parental supervision, sleep, and displacement of healthy activities should be considered alongside duration.

Introduction

Digital media have transformed the daily lives of children and adolescents. Exposure that was once dominated by television now includes smartphones, tablets, computers, video games, and social media.

Treating “screen time” as a single exposure is therefore problematic because content, purpose, social context, interactivity, and time of day may modify its effects.

Childhood and adolescence are periods of marked cognitive, emotional, and social development. Excessive or problematic screen use may displace sleep, physical activity, play, reading, and face-to-face interaction and may promote social comparison, overstimulation, or difficulties with self-regulation. Conversely, age-appropriate content and supported use may facilitate learning, communication, and social connection.

Systematic reviews have reported associations between digital exposure and anxiety, depression, hyperactivity, aggression, internalizing and externalizing problems, poorer psychosocial well-being, and socioemotional difficulties. Most underlying studies, however, are observational and rely on self-report or parent-report measures. Heterogeneous definitions, residual confounding, and reverse causation complicate interpretation. Statistical association consequently should not be equated with causation or clinical importance.

The recent proliferation of systematic reviews creates a need to integrate their conclusions, evaluate their methodological credibility, and identify double counting of primary studies. We aimed to synthesize and critically appraise the evidence on screen exposure, mental health, and socioemotional development in children and adolescents, focusing on magnitude, consistency, moderators, directionality, and implications for clinical practice and research.

Material and methods

Design and reporting

We conducted an umbrella review of systematic reviews and meta-analyses. Reporting followed PRISMA 2020 (1). PRISMA was used as a reporting framework, not as a quality-assessment instrument. The protocol was registered prospectively in PROSPERO (CRD420261460684); no substantial protocol amendments were made.

Eligibility criteria

The question followed a population–exposure–outcome framework. The population comprised people aged 0–18 years. Eligible exposures included duration, frequency, type, content, or pattern of television, smartphone, tablet, computer, video-game, social-media, or other digital-media use. Eligible outcomes included anxiety, depression, psychological distress, internalizing and externalizing problems, hyperactivity or attention-deficit/hyperactivity disorder symptoms, aggression, conduct problems, psychosocial well-being, social functioning, emotional regulation, socioemotional development, sleep-related behavioral outcomes, and risk behaviors. We included English-language systematic reviews, with or without meta-analysis, published as full journal articles from January 1, 2020, through December 31,

2025. Narrative and scoping reviews, protocols, editorials, primary studies, adult-only reviews, and reviews without separable pediatric data were excluded.

Information sources and search

PubMed/MEDLINE, Scopus, Epistemonikos, and the Cochrane Library were searched on June 19, 2026. Publication dates were restricted to January 2020 through December 2025. Reference lists of potentially eligible reviews were also examined. Complete reproducible strategies, fields, Boolean operators, filters, execution dates, and retrieval counts are provided in Supplementary Material 1.

Selection and data extraction

Records were deduplicated in Rayyan (2). Two reviewers independently screened titles and abstracts and then assessed potentially eligible full texts. Disagreements were resolved by consensus or consultation with a third reviewer. Two reviewers independently used a piloted standardized form to extract review characteristics, populations, exposures, outcomes, effect estimates, confidence intervals, heterogeneity, subgroup and sensitivity analyses, risk of bias, publication bias, funding, and conflicts of interest. Missing information was recorded as not reported and was not imputed.

Methodological quality and certainty

The 14 reviews were appraised with AMSTAR 2 across its 16 domains (3). Domain judgments were yes, partial yes, no, or not applicable. Overall confidence was classified as high, moderate, low, or critically low according to critical and noncritical weaknesses; no numerical total score was calculated. The assessment was initially performed by one evaluator, so no discrepancy-resolution procedure was used. Certainty for the principal outcome of each review was explored using risk of bias, inconsistency, indirectness, imprecision, and publication bias (4). Because primary studies were not reassessed de novo, these judgments represent a review-level approximation rather than a formal de novo GRADE assessment.

Overlap and synthesis

Primary-study references were normalized by author, year, title, DOI, PMID, or another identifier and matches were manually verified. Overlap was calculated as CCA=(N − r)/(rc − r), where N is the total number of study occurrences, r is the number of unique primary studies, and c is the number of reviews (5). Values of 0–5%, 6–10%, 11–15%, and > 15% were interpreted as slight, moderate, high, and very high overlap, respectively. Reviews without complete verifiable lists were excluded from the calculation, which was therefore labeled partial. A second-order meta-analysis was not performed because ages, exposures, instruments, outcomes, measures of effect, and primary-study overlap were not sufficiently

comparable. We used narrative and tabular synthesis by outcome, age group, and exposure pattern. A global funnel plot and Egger test were inappropriate for the same reason.

Ethics

This review used aggregate data from published studies and involved no contact with participants or access to identifiable personal information; institutional review board approval and informed consent were therefore not required.

Results

Review selection

The search identified 710 records: 144 in PubMed/MEDLINE, 497 in Scopus, 57 in Epistemonikos, and 12 in the Cochrane Library. After removal of 80 duplicates, 630 records were screened and 566 were excluded. Sixty-four reports were sought; two were not retrieved. Of 62 full texts assessed, 48 were excluded and 14 reviews were included (Fig. 1).

Review characteristics

The 14 reviews covered early childhood through adolescence and mainly included community-based observational studies (6–19). Exposures included total screen time, television, touch-screen devices, smartphones, video games, social media, and problematic use. Outcomes clustered around internalizing symptoms, externalizing problems, hyperactivity or attention-deficit/hyperactivity disorder, socioemotional development, psychosocial well-being, sleep, and risk behavior.

Mental health and well-being

For children aged 12 years or younger, Eirich et al. reported small correlations between screen duration and externalizing ($r = 0.11$) and internalizing problems ($r = 0.07$) (16). Harverson et al. found small inverse correlations with global psychosocial well-being ($r = -0.12$), social functioning ($r = -0.06$), behavioral functioning ($r = -0.10$), and parent–child relationships ($r = -0.13$) (10). Adolescent social-media reviews generally reported small associations with anxiety, depression, psychological distress, and risk behavior (6, 8, 13–15). Associations were more consistent when exposure was defined as problematic use, loss of control, or functional interference rather than duration alone.

Early childhood and socioemotional development

Among children younger than five years, Ahmer et al. reported pooled associations with overall socioemotional difficulties (OR 1.24, 95% confidence interval [CI] 1.16–1.33), hyperactivity (OR 1.39, 95% CI 1.15–1.67), and emotional problems (OR 1.21, 95% CI 1.15–1.27) (7). Other reviews described poorer well-being, disturbed sleep, and unfavorable general developmental indicators (9, 10, 12, 17, 19). Heterogeneous exposures and predominantly cross-sectional designs preclude causal interpretation.

Externalizing problems, attention, and directionality

The association with externalizing outcomes was small and appeared stronger for aggression than for attention-related symptoms. Thorell et al. found reciprocal longitudinal associations between digital media and attention-deficit/hyperactivity disorder symptoms, with greater consistency for problematic use (11). Vasconcellos et al. reported small bidirectional longitudinal coefficients between screen use and socioemotional problems (β = 0.06 in both directions) (18). These results favor a dynamic reciprocal model over a single causal sequence.

Sleep and family context

Excessive and nighttime use was associated with shorter and poorer-quality sleep, which co-occurred with behavioral and cognitive problems; mediation by sleep was not formally established (12). Devices in the bedroom, background television, higher parental screen use, and permissive norms were associated with greater exposure. Monitoring, parental self-efficacy, and consistent routines were associated with lower exposure (19).

Overlap, quality, and certainty

Across 11 evaluable reviews, 273 primary-study occurrences represented 220 unique studies. The partial CCA was 2.41%, indicating slight overall overlap within this subset. Three reviews lacked complete verifiable lists, so the estimate is not a global CCA for all 14 reviews and does not exclude higher overlap within particular pairs or outcomes. No review achieved high AMSTAR 2 confidence: one (7.1%) was moderate, six (42.9%) low, and seven (50.0%) critically low. Frequent critical weaknesses concerned absent prospectively registered protocols, incomplete lists of excluded full texts, and inadequate assessment or incorporation of primary-study risk of bias. Review-level certainty was predominantly low or very low.

Discussion

The main finding is that greater screen exposure is associated with less favorable emotional, behavioral, and socioemotional outcomes in children and adolescents, although most effects are small, heterogeneous, and sensitive to how exposure is defined. Problematic use is more consistently associated with adverse outcomes than duration alone. Loss of control, functional interference, content, purpose, and social context may therefore be more informative than total hours.

Early childhood may be particularly sensitive when screens displace face-to-face interaction, play, physical activity, shared reading, or sleep (7, 9, 10, 12, 17, 19). This does not imply that every form of exposure is harmful. Age-appropriate educational content, adult co-use, and purposeful interaction differ substantially from passive, prolonged, or nighttime exposure (9).

Findings for attention-deficit/hyperactivity disorder, anxiety, and depression require caution. Longitudinal syntheses suggest bidirectionality: digital use may precede small increases in symptoms, while children

and adolescents with emotional or self-regulation difficulties may also use screens more frequently or problematically (11, 18). Family environment, sleep, physical activity, socioeconomic circumstances, baseline vulnerability, and other residual confounders remain plausible explanations.

Clinical and family guidance should not be reduced to a universal hourly threshold. Assessment should explore content, timing, loss of control, interference with sleep and daily activities, exposure to harmful interactions, and emotional needs that motivate use. Interventions should involve caregivers, encourage healthy parental modeling, protect sleep, and establish predictable device-free routines and spaces.

The evidence base was dominated by observational and cross-sectional studies, self-report or parent-report measures, and heterogeneous exposure and outcome definitions. Residual confounding, reverse causation, imprecision, and high heterogeneity limit causal inference. Pandemic-era studies are additionally confounded by simultaneous changes in schooling, isolation, family stress, sleep, and activity.

This umbrella review also has limitations. Searches were restricted to English-language publications and did not include gray literature or specialized databases such as Embase, PsycINFO, and Web of Science. Two potentially eligible reports were not retrieved. Incomplete primary-study lists in three reviews prevented calculation of a global CCA. No second-order meta-analysis was conducted, and certainty was assessed at review level without de novo appraisal of every primary study. The synthesis consequently depends on the completeness and methodological decisions of the included reviews.

Future research should use longitudinal or experimental designs, objective exposure measurements, standardized definitions, and separate assessment of duration, content, context, and problematic use. Analyses should address confounding, temporal order, bidirectionality, absolute effects, clinical relevance, and vulnerable groups. Future reviews should publish complete study lists, extracted datasets, and analysis code to facilitate overlap assessment and replication.

Conclusion

Greater screen exposure is associated with less favorable mental health and socioemotional outcomes in children and adolescents, but associations are generally small and do not demonstrate direct causality. Findings are more consistent for problematic use, sleep interference, and displacement of healthy activities. Guidance should consider content, purpose, context, time of day, and parental supervision in addition to duration.

Declarations

Data availability

Search strategies, AMSTAR 2 domain judgments, and data used for the partial CCA are provided as supplementary materials. No statistical code was developed because a second-order meta-analysis was

not performed.

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Conflicts of interest

The authors declare no conflicts of interest.

AI-assisted technology disclosure

AI-assisted technology was used for English-language translation and editorial formatting. The authors critically reviewed, revised, and take full responsibility for the accuracy and integrity of the final manuscript. No AI tool was listed as an author.

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References

1. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD et al (2021) The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 372:n71
2. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A (2016) Rayyan-a web and mobile app for systematic reviews. Syst Rev 5:210
3. Shea BJ, Reeves BC, Wells G, Thuku M, Hamel C, Moran J et al (2017) AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. BMJ 358:j4008
4. Guyatt G, Oxman AD, Akl EA, Kunz R, Vist G, Brozek J et al (2011) GRADE guidelines: 1. Introduction-GRADE evidence profiles and summary of findings tables. J Clin Epidemiol 64:383–394
5. Pieper D, Antoine SL, Mathes T, Neugebauer EAM, Eikermann M (2014) Systematic review finds overlapping reviews were not mentioned in every other overview. J Clin Epidemiol 67:368–375
6. Vannucci A, Simpson EG, Gagnon S, Ohannessian CM (2020) Social media use and risky behaviors in adolescents: a meta-analysis. J Adolesc 79:258–274
7. Ahmer A, Raza M, Azhar M, Rahman A, Das JK, Jafri SK (2025) A systematic review and meta-analysis on the impact of screen-time on the social-emotional development of children under five

years. J Coll Physicians Surg Pak 35:351–358
8. Kerr B, Garimella A, Pillarisetti L, Charlly N, Sullivan K, Moreno MA (2025) Associations between social media use and anxiety among adolescents: a systematic review study. J Adolesc Health 76:18–28
9. Rocha B, Nunes C (2020) Benefits and damages of the use of touchscreen devices for the development and behavior of children under 5 years old-a systematic review. Psicol Reflex Crit 33:24
10. Harverson J, Paatsch L, Anglim J, Horwood S (2025) Digital technology use and well-being in young children: a systematic review and meta-analysis. Comput Hum Behav 168:108660
11. Thorell LB, Burén J, Ström Wiman J, Sandberg D, Nutley SB (2024) Longitudinal associations between digital media use and ADHD symptoms in children and adolescents: a systematic literature review. Eur Child Adolesc Psychiatry 33:2503–2526
12. Merín L, Toledano-González A, Fernández-Aguilar L, Nieto M, del Olmo N, Latorre JM (2024) Evaluation of the association between excessive screen use, sleep patterns and behavioral and cognitive aspects in preschool population: a systematic review. Eur Child Adolesc Psychiatry 33:4097–4114
13. Fassi L, Thomas K, Parry DA, Leyland-Craggs A, Ford TJ, Orben A (2024) Social media use and internalizing symptoms in clinical and community adolescent samples: a systematic review and meta-analysis. JAMA Pediatr 178:814–822
14. Abdoli M, Khoshgoftar M, Jadidi H, Daniali SS, Kelishadi R (2024) Screen time and child behavioral disorders during COVID-19 pandemic: a systematic review. Int J Prev Med 15:9
15. Alfredson QD, Garimella A, Kerr B, Moreno MA (2024) Systematic review of studies measuring social media use and depression, anxiety, and psychological distress in adolescents: 2018–2020. WMJ 123:578–588
16. Eirich R, McArthur BA, Anhorn C, McGuinness C, Christakis DA, Madigan S (2022) Association of screen time with internalizing and externalizing behavior problems in children 12 years or younger: a systematic review and meta-analysis. JAMA Psychiatry 79:393–405
17. Lumban Gaol RCC, Fajar NA (2025) The effects of screen time on early childhood development: a systematic literature review. Jurnal Info Kesehatan 23:805–818
18. Vasconcellos RP, Sanders T, Lonsdale C, Parker P, Conigrave J, Tang S et al (2025) Electronic screen use and children's socioemotional problems: a systematic review and meta-analysis of longitudinal studies. Psychol Bull 151:513–543
19. Veldman SLC, Altenburg TM, Chinapaw MJM, Gubbels JS (2023) Correlates of screen time in the early years (0–5 years): a systematic review. Prev Med Rep 33:102214

Tables

Table 1

Included reviews consistently reported small or context-dependent associations between screen exposure and mental health or socioemotional outcomes.

Review	Primary evidence	Exposure	Main outcome	Main finding
Vannucci 2020	27; 67,407 adolescents	Social media	Risk behaviors	r = 0.21 overall; r = 0.19 substance use; r = 0.21 sexual risk
Ahmer 2025	12; age < 5 y	Total screen time	Socioemotional development	OR 1.24; hyperactivity OR 1.39; emotional problems OR 1.21
Kerr 2025	32 studies	Social media	Anxiety	56.3% reported a positive association; stronger for problematic use
Rocha & Nunes 2020	11; age < 5 y	Multiple screens	Development	Potential harm more frequent with prolonged, unsupervised exposure
Harverson 2025	51; 83,862 children	Digital technology	Psychosocial well-being	Small inverse correlations, r = −0.06 to −0.13
Thorell 2024	28 longitudinal studies	Digital media	ADHD symptoms	Reciprocal associations; more consistent for problematic use
Merín 2024	13 preschool studies	Screen use	Sleep/behavior/cognition	Greater use associated with poorer sleep and behavioral outcomes
Fassi 2024	143; 1,094,890 adolescents	Social media	Internalizing symptoms	Clinical samples: r = 0.10 for time and r = 0.12 for engagement
Abdoli 2024	12; 14,483 participants	Screen time during COVID-19	Anxiety/depression	Unfavorable associations; strong contextual confounding
Alfredson 2024	19 adolescent studies	Social media	Depression/anxiety/distress	63% reported positive associations

Review	Primary evidence	Exposure	Main outcome	Main finding
Eirich 2022	87; 159,425 children	Screen duration	Behavior problems	Externalizing r = 0.11; internalizing r = 0.07
Lumban Gaol & Fajar 2025	15 early-childhood studies	Screen time	General development	Narrative associations across motor, language, cognitive, socioemotional domains
Vasconcellos 2025	132 longitudinal; 292,739 children	Electronic screens	Socioemotional problems	Bidirectional β = 0.06; larger estimates for gaming
Veldman 2023	52–53 studies; age 0–5 y	Screen time correlates	Family/sleep correlates	Only two studies high quality; mixed evidence across correlates

Table 2

Most included reviews had low or critically low AMSTAR 2 confidence.

Overall confidence	Reviews	n (%)
High	None	0 (0.0)
Moderate	Harverson et al. (2025)	1 (7.1)
Low	Ahmer; Thorell; Fassi; Abdoli; Vasconcellos; Veldman	6 (42.9)
Critically low	Vannucci; Rocha & Nunes; Eirich; Merín; Alfredson; Kerr; Lumban Gaol & Fajar	7 (50.0)

AMSTAR 2 indicates A MeaSurement Tool to Assess systematic Reviews 2. Overall confidence was based on critical and noncritical weaknesses; no numerical total score was calculated.

Figures

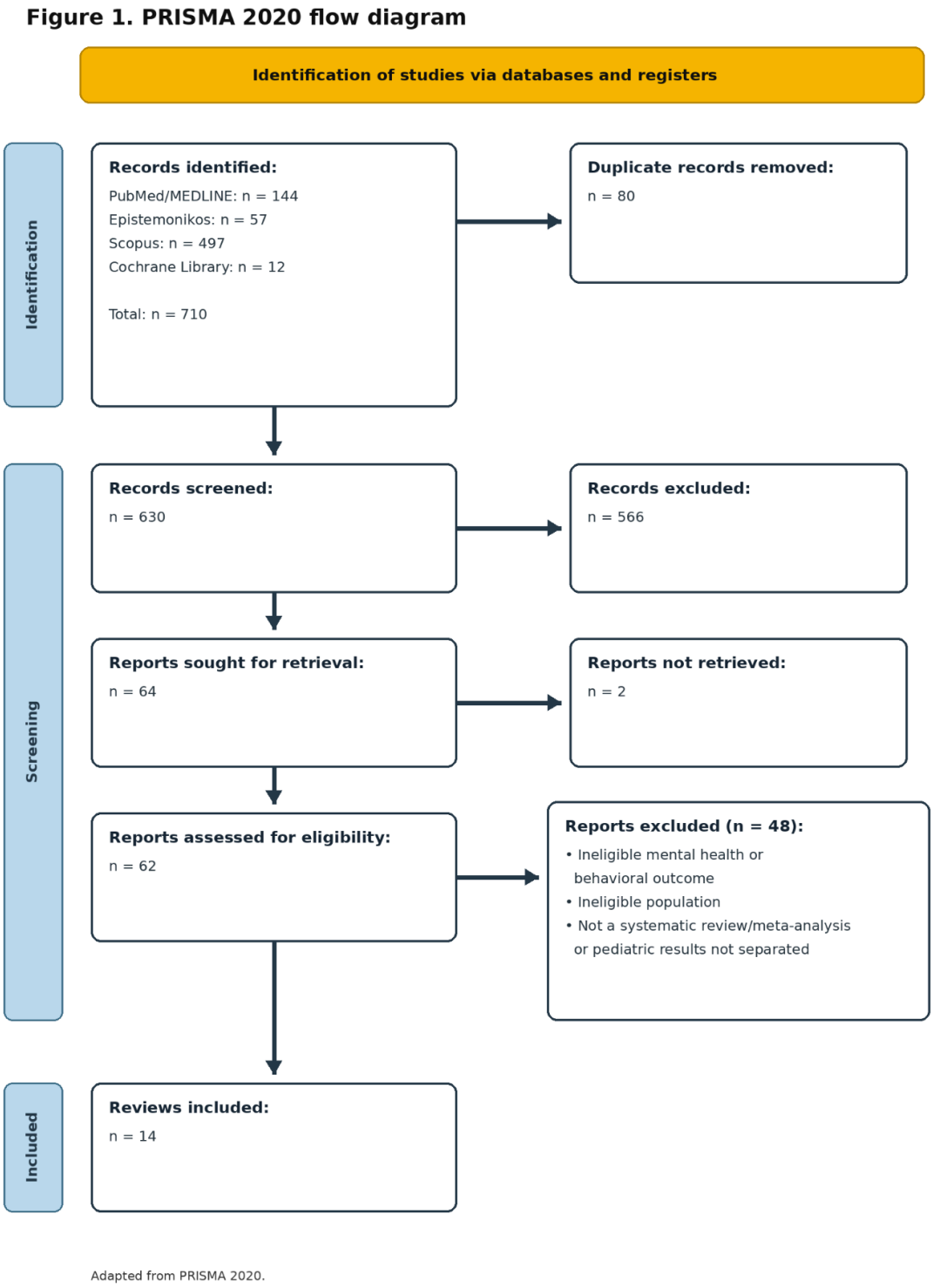


Figure 1

PRISMA 2020 flow diagram showing identification of 710 records and inclusion of 14 systematic reviews.