

Screen-based activities and children and young people's mental health and psychosocial wellbeing: a systematic map of reviews



Dickson K, Richardson M, Kwan I, MacDowall W, Burchett H,
Stansfield C, Brunton G, Sutcliffe K, Thomas J

January 2019

The Department of Health Reviews Facility is a collaboration between the following centres of excellence

The authors of this report are:

Dickson K¹, Richardson M¹, Kwan I¹, MacDowall W², Burchett H², Stansfield C¹, Brunton G¹, Sutcliffe K¹, Thomas J¹

¹ – EPPI-Centre, UCL Institute of Education, University College London, London, UK

² – London School of Hygiene and Tropical Medicine, London, UK

Acknowledgements

Funding

This report is independent research commissioned by the National Institute for Health Research (NIHR) Policy Research Programme (PRP) for the Department of Health and Social Care. It was funded through the NIHR PRP contract with the EPPI Centre at UCL (Reviews facility to support national policy development and implementation, PR-R6-0113-11003). The views expressed in this publication are those of the author(s) and not necessarily those of the NHS, the National Institute for Health Research or the Department of Health and Social Care.

Funder involvement

The Department of Health and Social Care Mental Health policy team was consulted to understand the context of the issue under study, and collaborated on the development of the research question(s) and focus of the review.

Conflicts of interest

There were no conflicts of interest in the writing of this report.

This report should be cited as: Dickson K¹, Richardson M¹, Kwan I¹, MacDowall W², Burchett H², Stansfield C¹, Brunton G¹, Sutcliffe K¹, Thomas J¹ (2018) *Screen-based activities and children and young people's mental health: A Systematic Map of Reviews*, London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education, University College London.

ISBN: 978-1-911605-13-3

© Copyright

Authors of the systematic reviews on the EPPI-Centre website (<http://eppi.ioe.ac.uk/>) hold the copyright for the text of their reviews. The EPPI-Centre owns the copyright for all material on the website it has developed, including the contents of the databases, manuals, and keywording and data-extraction systems. The centre and authors give permission for users of the site to display and print the contents of the site for their own non-commercial use, providing that the materials are not modified, copyright and other proprietary notices contained in the materials are retained, and the source of the material is cited clearly following the citation details provided. Otherwise users are not permitted to duplicate, reproduce, re-publish, distribute, or store material from this website without express written permission.

Contents

Executive Summary.....	vii
1 Background.....	1
1.1 Screen-based activities and children and young people’s mental health.....	1
1.2 Existing review-level evidence and mapping the literature.....	2
1.3 Screen-based activities: conceptual frame informing the scope of the map	2
1.4 Review aims and questions	3
2 Brief Methods	4
2.1 Policy stakeholder engagement	4
2.2 Study identification	4
2.3 Eligibility criteria.....	4
2.4 Data extraction.....	4
2.5 Critical appraisal	6
2.6 Quality assurance	6
3 Findings	7
3.1 Flow of literature through the map.....	7
3.2 Brief overview of reviews	8
3.2.1 Publication rate and population groups	8
3.2.2 Topic focus	8
3.2.3 Aims of included reviews.....	9
3.3 Screen time	9
3.3.1 Key findings	9
3.3.2 Introduction.....	10
3.3.3 Aims of included reviews.....	10
3.3.4 Review characteristics	10
3.3.5 Outcomes	11
3.3.6 Quality of included reviews	12
3.4 Internet use.....	13
3.4.1 Key findings	13
3.4.2 Introduction.....	13
3.4.3 Aims of included reviews.....	13
3.4.4 Review characteristics	13
3.4.5 Outcomes	14
3.4.6 Quality of included reviews	15

3.5	Problematic/addictive internet use.....	16
3.5.1	Key findings	16
3.5.2	Introduction.....	16
3.5.3	Aims of included reviews.....	16
3.5.4	Review characteristics	16
3.5.5	Outcomes	17
3.5.6	Quality of included reviews	19
3.6	Social media	19
3.6.1	Key findings	19
3.6.2	Introduction.....	20
3.6.3	Aims of included reviews.....	20
3.6.4	Review characteristics	20
3.6.5	Outcomes	21
3.6.6	Quality of included reviews	23
3.7	Gaming.....	23
3.7.1	Key findings	23
3.7.2	Introduction.....	24
3.7.3	Aims of included reviews.....	24
3.7.4	Review characteristics	24
3.7.5	Outcomes	25
3.7.6	Quality of included reviews	26
3.8	Cyberbullying.....	27
3.8.1	Key findings	27
3.8.2	Introduction.....	27
3.8.3	Aims of included reviews.....	27
3.8.4	Review characteristics	28
3.8.5	Outcomes	28
3.8.6	Quality of included reviews	30
3.9	Sexting.....	30
3.9.1	Key findings	30
3.9.2	Introduction.....	31
3.9.3	Aims of included reviews.....	31
3.9.4	Review characteristics	31
3.9.5	Outcomes	32

3.9.6	Quality of included reviews	33
3.10	Smartphone use	34
3.10.1	Key findings	34
3.10.2	Introduction.....	34
3.10.3	Aims of included reviews.....	34
3.10.4	Review characteristics	34
3.10.5	Outcomes	35
3.10.6	Quality of included reviews	35
4	Discussion.....	37
4.1	Summary of the evidence.....	37
4.2	Concepts and definitions of ‘screen-based activities’	37
4.3	Strengths and limitations	39
5	Conclusions	40
5.1	Gaps in the evidence	40
5.2	Research implications.....	40
6	Detailed methods.....	42
6.1	Policy stakeholder engagement	42
6.2	Search strategy.....	42
6.3	Including studies in the systematic evidence map	42
6.4	Data extraction.....	43
6.5	Quality appraisal.....	45
6.6	Data management and quality assurance	46
7	References	47
APPENDICES		55
	Appendix 1: PRISMA checklist	55
	Appendix 2: Methods	57
	Appendix 3: Further details of included reviews	68
	Appendix 3.2: Screen time	68
	Appendix 3.3 Internet Use.....	75
	Appendix 3.4 Problematic/addictive Internet Use	79
	Appendix 3.5 Social Media	85
	Appendix 3.6 Gaming	92
	Appendix 3.7 Cyberbullying.....	98
	Appendix 3.8 Sexting.....	105

Appendix 3.9 Smartphone use 109

Preface

How to read this report

This report commences with an executive summary of the systematic map followed by the technical report. The technical report includes the background and aims of the map in Chapter 1 and a brief overview of the methods in Chapter 2. The findings in Chapter 3 start with an overview of the results from the search and a descriptive overview of the reviews included in the map. The findings are then presented, in turn, for each sub-set of reviews determined by the topic focus (e.g. screen time, internet use etc.). In Chapter 4, a discussion of the map's overall findings and strengths and weaknesses are outlined, and in Chapter 5, the gaps in the evidence base and future research implications are presented. This is followed by a more comprehensive overview of the methods used to conduct this map in Chapter 6, which details how the reviews were identified, screened, coded and critically appraised, during the mapping process.

Executive Summary

Background

In a world of rapid technological advance, the functionality of different types of screen-based devices has continued to evolve. As society has moved from the passive watching of immobile TVs installed in the corner of a room, to the consumption of media on computers and mobile devices, to social media applications which enable users to generate their own content and interact in ‘real time’ (Galpin and Taylor, 2018), the popularity and widespread use of screen-based activities has grown among children and young people (CYP). Accompanying this rapid change in technology and patterns of use, concerns about the possible impact of increased engagement in screen-based activities on CYP’s mental health and psychosocial wellbeing have also grown (Frith, 2017, Livingstone et al., 2018). These concerns, and the need to provide guidance and advice, can be informed by an examination of the available research evidence. Based on the volume and range of reviews located in a scoping exercise, a systematic map of the review literature covering the range of screen-based activities was conducted.

Aim and review questions

The primary aim of this research is to produce a descriptive overview of the characteristics and quality of existing review literature examining the relationship between screen-based activities and CYP’s mental health and psychosocial wellbeing. To achieve this, we located systematic reviews, described their key characteristics and assessed their methodological rigour with a view to answering the following research questions:

- What is the nature and extent of systematic review literature on screen-based activities and CYP’s mental health and psychosocial wellbeing?
- What is the quality of systematic review literature on screen-based activities and CYP’s mental health and psychosocial wellbeing?
- What are the gaps in the systematic review literature evidence base and priorities for new evidence synthesis and primary research?

As this is a systematic map rather than a review, it does not produce a synthesis of findings, but an account of what evidence has been synthesised (Gough et al., 2017). Systematic maps are useful for providing an overview of a broad research field and are particularly beneficial for informing future research effort by identifying research gaps and avoiding duplication of effort (Snilstveit et al. 2013; Sutcliffe et al. 2017).

Methods

Systematic search: to identify systematic reviews, we completed a search of 12 topic related bibliographic databases and six online resources in August 2018.

Criteria for including reviews: Reviews were included if they were published in or after 2007; investigated the relationship between screen-based activities and mental health and psychosocial outcomes; included CYP under 25; and were conducted using systematic methods (i.e. searched more than two databases and reported eligibility criteria).

Describing reviews: To understand the focus of included reviews we captured information on a number of dimensions including: the nature of the screen-based activity examined; the aims of the review; the mental health outcomes assessed; the population focus; and the size of the evidence base and type of synthesis undertaken.

Critical appraisal: We assessed the methodological quality of included reviews of quantitative studies by adapting the AMSTAR 2 criteria (Shea et al., 2017). We did not undertake appraisal of the reviews of qualitative studies because of the current lack of a validated/agreed tool for judging the quality of this type of review.

Key findings

Included reviews

The association between screen-based activities and the mental health of CYP is a highly reviewed area of research, with a total of 82 systematic reviews included in the map. Most reviews were published in 2014 or later, highlighting contemporary interest in this research area. A summary of findings on each dimension of characteristics is provided in the following sections. See Table A for an overview of review aims and quality.

Types of screen-based activities

The reviews synthesised evidence on a range of screen-based activities:

- Social media (n=19)
- Cyberbullying (n=19)
- Screen time (n=11)
- Problematic/addictive internet use (n=10)
- Gaming, including e-gaming and gaming addiction (n=8)
- Sexting (n=7)
- Internet use (n=6)
- Smartphone use (n=2)

Aims of included reviews

- Most reviews sought to **investigate the relationship** between screen-based activities and mental health and psychosocial outcomes, drawing mainly on **cross-sectional data** (n=75).
- **Fewer reviews attempted to explore the risk factors** (n=6) or **consequences** (n=11) of screen-based activities by conducting syntheses of **longitudinal data**.
- **Even fewer reviews explored** CYP's experience of **engagement with screen-based activities** by conducting a **qualitative evidence synthesis** (n=4).

Outcomes

A wide spectrum of mental health and psychosocial outcomes were investigated across the reviews. These included commonly recognised mental health outcomes such as **depression and anxiety**, in addition to outcomes such as **self-esteem, loneliness, social connectedness** and **life satisfaction**.

Population focus

Fifty-seven reviews focused solely on CYP populations (i.e. people up to the age of 25 years), while the remaining twenty-five reviews included populations of any age. Overall, there was greater

emphasis on CYP populations in the context of screen time, gaming, social media, cyberbullying, and sexting compared to internet use and problematic internet use.

Size and analysis of the evidence

The number of included studies varied considerably across reviews; from under 10 to over 200 in some cases; sometimes reflecting the breadth of the reviews' scope and approach to searching. Most reviews combined their findings using **narrative methods** to produce summative statements about findings, rather than combining the results from included studies in a statistical **meta-analysis**.

Quality of reviews

Most reviews on **screen time** were classified as high quality. The reviews of social media, problematic/addictive internet use and cyberbullying **varied considerably**, but also included high quality reviews. The reviews on internet use, sexting and smartphone use, were of medium or low quality. All the reviews on gaming were classified as low quality.

Conclusions

This systematic map of reviews highlights some key gaps in the field. First, the tendency in primary studies to draw on cross-sectional data with a lack of prospective research designs, prevents reviews from providing a clear indication of nature of any causal relationship between screen-based activities and mental health outcomes. Second, evidence on the factors potentially mediating and/or moderating the relationship between screen-based activities and mental health outcomes was sparse, limiting our understanding of what influences CYP behaviour in this area. Third, few reviews analysed subsets of populations (e.g. specific age groups, gender, mental health status) which could help contextualise the relationship between screen-based activities and mental health and psychosocial outcomes. Lastly, although some reviews included qualitative studies, there is a lack of synthesis of critically appraised evidence about CYP's experiences of different types of screen-based activities. Future reviews generating evidence of this kind are needed to improve our understanding of the consequences of, and causal mechanisms that explain how and why, the use of screen-based activities may impact mental health and psychosocial outcomes, over time.

Thus, **future evidence syntheses** in this area are needed to explore:

The dose-response relationship by examining the

- prospective association between frequency and/or intensity of screen-based activity measured at a broad level (e.g. social media, gaming, internet use) and mental health and psychosocial outcomes.

Mechanisms of impact by examining the

- prospective association between different types of screen-based activities and other factors related to screen-based activity (e.g. scrolling websites, instant messaging, posting selfies, type/timing of gaming, blogging,) and different mental health and psychosocial outcomes.
- impact of different screen-based activities on mental health and psychosocial outcomes moderated by contextual factors (e.g. peer group, school environment, parenting) and subsets of CYP populations (e.g. age, gender, mental health status).

- experience of screen-based activities, drawing on CYP's views about how it affects their mental health and psychosocial wellbeing.

The potential for new evidence syntheses outlined above hinges on the availability of longitudinal **primary research** that explores:

- whether there is a dose-response relationship between screen-based activities and mental health and psychosocial wellbeing;
- whether screen-based activities act as either an antecedent of and/or are a consequence of mental health and psychosocial wellbeing; and
- whether these temporal relationships are moderated by contextual factors or are similar or different across a range of CYP population groups.

The greater availability of this type of knowledge is vital to support policymakers, parents, CYP and the wider community make informed choices about their mental health and how they engage with screen-based activities.

Table A: Overview of reviews by analysis aims and quality

	Total number of reviews on each type of screen-based activity	Number of reviews across each analysis aim <i>(Note: not mutually exclusive – some individual reviews had more than one aim)</i>				Number of reviews at each quality level <i>(Note: Reviews of CYP views not appraised)</i>		
		<i>Associations between screen-based activity and mental health or psychosocial outcomes*</i>	<i>Risk factors of screen-based activity**</i>	<i>Consequences of screen-based activity**</i>	<i>Young people’s views***</i>	High	Medium	Low
Social media	19	18	1	1	1	5	6	7
Cyberbullying	19	19	0	0	0	3	6	10
Screen time	11	9	1	7	1	8	2	0
Problematic internet use	10	8	2	1	0	2	6	2
Gaming	8	8	2	2	0	0	0	8
Internet use	6	6	0	0	0	0	2	4
Sexting	7	5	0	0	2	0	3	2
Smartphone use	2	2	0	0	0	0	2	0
Total	82	75	6	11	4	18	27	33

Mixed data sets (e.g. cross-sectional, longitudinal, qualitative); **Longitudinal data only; *Qualitative evidence only*

1 Background

1.1 Screen-based activities and children and young people's mental health

The use of screen-based electronic devices plays a central part in the lives of many children and young people (CYP); from watching TV to the use of computers and smartphones for school work, gaming and connecting with friends via social media (Ngantcha et al., 2018, Ofcom, 2016). Collectively, these screen-based activities occupy a large part of children's worlds, often from birth (Livingstone and Franklin, 2018). As the technical functionality of screen-based devices has developed to become more mobile and interactive, so have their pervasiveness and use, such that engaging with multiple screens simultaneously is also becoming increasingly common (Galpin and Taylor, 2018, Mullan, 2017). For example, watching television while 'joining the discussion' online or playing web-based multiplayer video games, which allow CYP to interact with others across the world, while simultaneously listening to video blogs online which discuss the game. Similarly, social media platforms not only enable users to generate their own content but also to share content across platforms (e.g. by linking 'stories' on Snapchat to Instagram to Facebook), enabling communication in real time to broader and larger audiences.

In 2016 the American Academy of Paediatrics made a recommendation that time spent in front of a screen should not exceed two hours per day (APA 2016). However since then there has been a rise in the personal ownership of electronic devices (e.g. smartphones, gaming consoles, computers, televisions, tablets) by CYP (Mascheroni and Cuman, 2014), increasing rather than decreasing their opportunities for engagement in screen-based activities (Griffiths and Kuss, 2017, Ofcom, 2017). Estimates of CYP's engagement with screens vary, spanning from two to eight hours per day depending on contextual and demographic factors (Carson et al., 2016, Mullan, 2017, Tremblay and et al., 2011).

Although the benefits of screen-based activities continue to be acknowledged, these are largely outweighed by growing anxiety about the possible detrimental effects on CYP's mental health and psychosocial wellbeing (Kardfelt-Winther, 2017, McDool et al., 2016, Przybylski and Weinstein, 2017). Screen-based online platforms are often promoted as a tool to enhance learning (DCMS, 2017), to support the formation and maintenance of social networks and to reduce social isolation and feelings of loneliness. However this is often contrasted with their potential to impact mood, self-esteem, anxiety, body image, attention span and focus negatively (Boyd, 2014), particularly as a result of extended or prolonged time engaged with screens (Salmela-Aro et al., 2017, Sampasa-Kanyinga and Lewis, 2015).

In addition to the frequency and intensity of screen-based activities, there are also increasing concerns about the types of online activities CYP's engage in, such as viewing sexually explicit or violent videos, the use of self-harm message boards, pro-eating disorder websites, e-gaming with strangers and cyberbullying. However the extent to which there is a dose-response relationship between screen-based activities and mental health and psychosocial wellbeing, and whether this is mediated by type of engagement, continues to be explored and debated in the field (Liu et al., 2016, Livingstone et al., 2018).

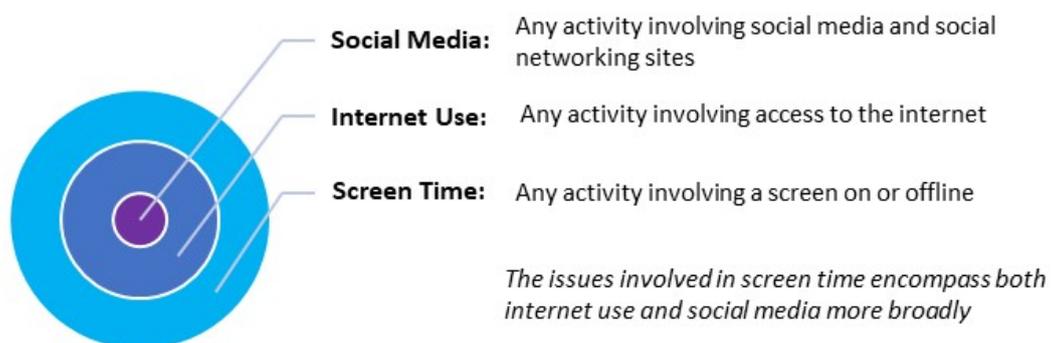
1.2 Existing review-level evidence and mapping the literature

An initial scoping search for studies on the impact of social media on CYP's mental health identified several systematic reviews published in the last ten years, highlighting current interest in this field. Closer inspection of these reviews indicated that they were concerned with both the beneficial and harmful effects of online communication on adolescent wellbeing (Best et al., 2014) and the relationship between social media and specific mental health presentations, such as depressive symptoms (McCrae, 2017), self-harm (Dyson et al., 2016) and eating disorders (Holland and Tiggemann, 2016). The search also captured related systematic reviews on internet addiction, cyberbullying and sexting. Based on the volume and range of reviews located in the scoping exercise, it was decided that a systematic map of the review literature covering the range of screen-based activities would be conducted. A systematic map is not a review, therefore it does not produce a meta-synthesis of findings, but rather an account of what evidence has been synthesised (Gough et al., 2017). Undertaking a map of the literature, before embarking on a new systematic review is useful as it provides an overview of a broad research field, which is beneficial for informing future research effort by identifying research gaps and avoiding duplication of effort (Snilstveit et al. 2013; Sutcliffe et al. 2017).

1.3 Screen-based activities: conceptual frame informing the scope of the map

For the purpose of this map, screen-based activities were understood to refer to any time spent looking at and engaging with screens. At the broadest level, this is often conceptualised as 'screen time' with 'internet use' and 'social media' as subsets of screen-time based activities (see Figure 1.3). Literature on screen time does not necessarily discriminate based on the type of screen-based activity but instead considers the impact of watching TV as conceptually similar to the use of computers, video games, as well as tablets and mobile phones (regardless of what these devices are used for). The use of the internet is also broad, but its attention is focused on engagement online (e.g. all types of mobile applications, websites). Narrower still, social media is conceptualised as a form of internet use with specific features focused on real time and other types of interactive capabilities. This map also encompasses the types of engagement that specifically occur online, such as cyberbullying and sexting, which can be via the internet or social media platforms. Further conceptual definitions informing this review are outlined as part of the methods in Section 6.2.

Figure 1.3: Screen-based activities



1.4 Review aims and questions

The primary aim of this research, commissioned by the Department of Health and Social Care (DHSC) in England, is to map and critically appraise existing review literature systematically, examining the relationship between screen-based activities and CYP's mental health and psychosocial wellbeing. To achieve this, we located and described the key characteristics of systematic reviews, with a view to answering the following research questions:

- What is the nature and extent of systematic review literature on screen-based activities and CYP's mental health and psychosocial wellbeing?
- What is the quality of systematic review literature on screen-based activities and CYP's mental health and psychosocial wellbeing?
- What are the gaps in the systematic review-literature evidence base and priorities for new evidence synthesis and primary research?

2 Brief Methods

This chapter provides a brief overview of the methods used to conduct this systematic map. A more detailed account of the methods is provided in Chapter 6. This report adheres to the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) guidance reported in Appendix 1. Where necessary, the PRISMA guidance has been adapted to accommodate the systematic map approach taken.

2.1 Policy stakeholder engagement

This map was informed and shaped by the commissioners throughout the review process. Meetings were held between the EPPI-Centre and the Chief Medical Officer and DHSC policy analysts to ensure the review remained closely aligned with their needs and emerging policy requirements.

2.2 Study identification

Searches of 12 bibliographic databases that contain research literature on mental health, healthcare, social science and education were carried out in August 2018. We also searched six other online resources. Systematic reviews were also identified from title and abstract screening of a concurrent review undertaken at the EPPI-Centre (Dickson et al., 2018).

2.3 Eligibility criteria

To be included in the map, reviews needed to meet the following criteria:

Date: Be published in or after 2007

Topic: Investigate the relationship between screen-based activities and mental health and/or psychosocial wellbeing

Population: Include studies with CYP aged under 25 years

Study design: be a systematic review (i.e. search more than two databases and report eligibility criteria)

Further details outlining the definitions and rationale informing these criteria is provided in Section 6.3.

2.4 Data extraction

A coding tool was developed to extract information from the included reviews. These descriptive codes enabled us to quantify key characteristics of the evidence base. To achieve this, we categorised reviews according to the overall focus as reported by the authors (e.g. screen time, social media, cyberbullying, etc) before coding information about the review aims, the scope of the review based on the eligibility criteria applied, the extent of the literature they searched for and identified and the type of outcomes they reported. We were also interested in reporting if reviews had identified and synthesised longitudinal data, as this appeared to be a noticeable gap in our initial scoping exercise of reviews on social media. Table 2.4.1 provides an example of the type of data extracted from all reviews. The full coding tool is available in Appendix 2.2.

Table 2.4.1 Coding tool

Domains		Criteria/Guidance: Code	Codes e.g.:
Review focus and aims	Publication year	The year the review was published	- 2010, 2011, 2012 etc.
	Focus	Screen-based activity focus of reviews	- Screen time; Internet Use; - Social Media; Etc.
	Aims of included reviews	Key aims of the review	- Associations between screen-based activity and MH outcomes; - Longitudinal associations (e.g. risk factors and consequences of screen-based activities - CYP's view/experiences
Review Scope*	Geographical location	Any geographical limits placed on inclusion of studies	- High income countries only; - No geographical limits placed
	Population: age	Age range reviews focused on	- CYP aged 0-25 only - No age limits placed
	Population: other targeting	Any focus on other CYP population characteristics of interest	- CYP with mental health issues - No population targeting
	Study design	Study design inclusion criteria	- Longitudinal studies only - Quantitative studies etc.
	Date range searched	The date range of search reported in methods	- Provide year to year as stated in the reviews - Not reported
	Number of included papers	The number of papers that passed inclusion screening	- N=papers included - Not reported
	Type of synthesis	Approach taken to combine and analyse the data	- Summative synthesis**; - Meta-analysis - Qualitative evidence synthesis
Outcomes and factors	Associations between screen-based activities and outcomes	Code outcomes and factors based on the aim of the review question being investigated	- Mental health outcomes: (e.g. depression, anxiety, self-esteem) - Psychosocial outcomes (e.g. life satisfaction, social connectedness) - Factors (e.g. personality traits, demographics)
	Longitudinal risk factors of screen-based activities		
	Longitudinal consequences of screen-based activities		

* Based on the review eligibility criteria, not the description of included primary studies.

** code when reviews make summary statements made about the quantity of evidence, such as 'two studies found an association between screen time and anxiety', but which do not conduct a meta-analysis.

Outcomes were coded according to whether they were answering a review question on the 'associations' between screen-based activities and mental health or psychosocial outcomes or answering a question on the longitudinal risk factors (precursors) or consequences of engagement in screen-based activities and mental health or psychosocial outcomes. For example, some reviews sought to explore the associations (relationship) between screen-based activities and outcomes by combining studies of a single design (e.g. cross-sectional survey data) whilst others included more than one study design to address this review question (e.g. cross-sectional or longitudinal survey data, content analysis, and/or qualitative studies). Other reviews examined the risk factors (precursors) or consequences of screen-based activities drawing on longitudinal data only. As stated above it was deemed import to capture which reviews had synthesised studies whereby screen-based activity (independent variable) has been measured prior to, and with a time lapse, between mental health and psychosocial outcomes (dependent variable).

2.5 Critical appraisal

We assessed the methodological quality of included reviews of largely quantitative studies using the AMSTAR 2 criteria (Shea et al., 2017). We modified the tool slightly to accommodate our focus on non-intervention studies (see Section 6.5 for further details). We did not undertake appraisal of the reviews of qualitative views because of the current lack of a validated/agreed tool for judging the quality of this type of review.

2.6 Quality assurance

We piloted the eligibility criteria and coding tool by comparing decisions in groups of two reviewers using systematic review software, EPPI-Reviewer 4 (Thomas et al., 2010). Citations identified by our searches were initially screened on titles and abstracts. Full reports were obtained for those citations judged as meeting the eligibility criteria or where there was insufficient information from the title and abstract to assess relevance. At each stage of dealing with citations for the review (screening titles and abstracts, screening full reports and double coding) an initial sample of citations was coded by reviewers independently and differences resolved by discussion. If agreement was adequate (e.g. between 80-90%) for this initial sample, the remaining citations were screened or coded by a single reviewer alone. Again, where differences arose, they were resolved by seeking guidance from a third review author.

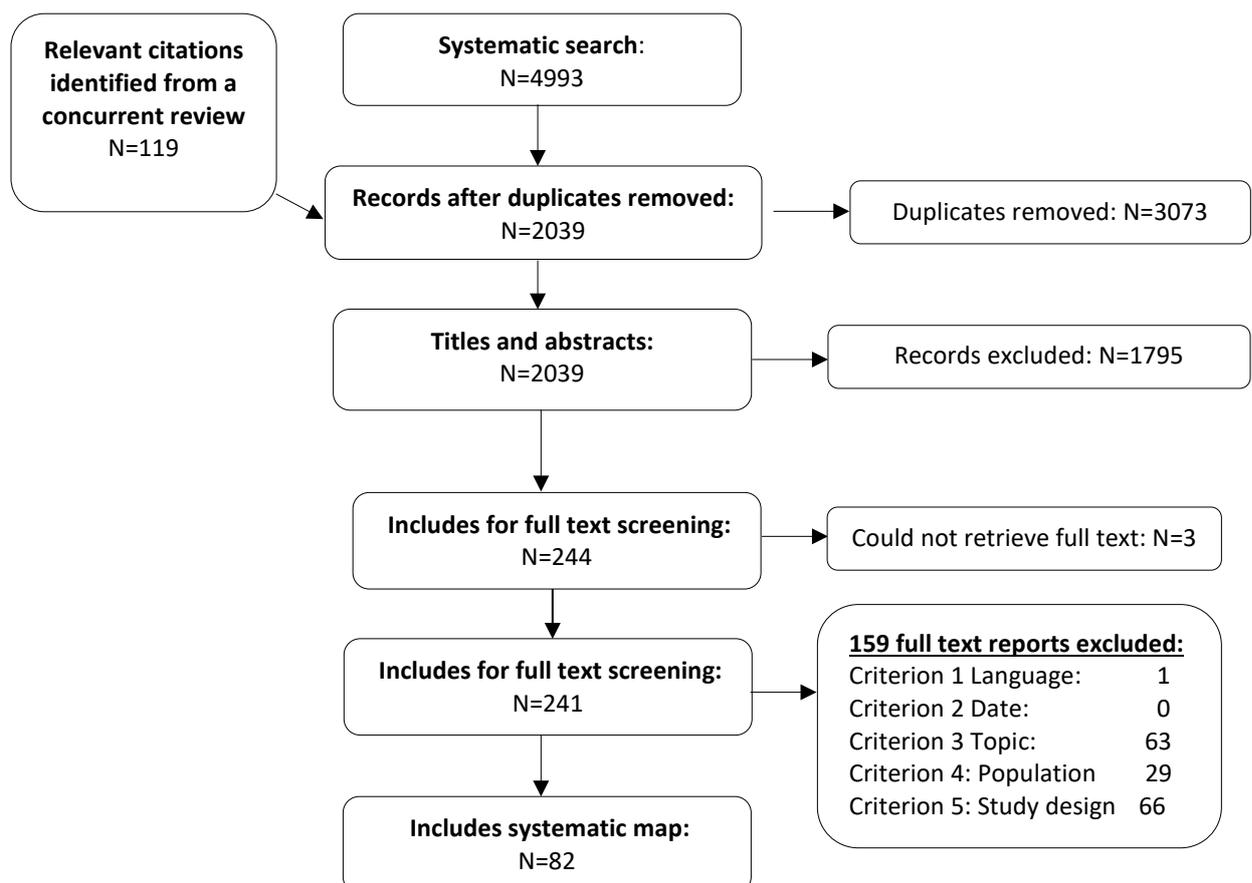
3 Findings

This chapter reports the findings of our systematic map. In line with most systematic maps which describe a large body of evidence, references are not cited within the body of the text (Dickson et al., 2013, Stokes et al., 2017); instead for transparency in reporting, tables corresponding to and informing the analysis, grouped by each topic foci, are provided in the appendices (see Appendix 3).

3.1 Flow of literature through the map

The database searches located 4,993 potential citations for inclusion in the review. Citations were identified from this search and one for a concurrent review of primary research on social media also being undertaken at the EPPI-Centre (Dickson et al., 2018). Duplicates were removed from the results of both searches and 119 citations were identified as potentially relevant from the concurrent review, leaving 2,039 citations to screen. A total of 244 citations were identified as potentially relevant from title and abstract screening, of which 241 were retrievable and screened on full text. From this process 82 systematic reviews were identified as relevant to the review. The flow of literature is shown in Figure 3.1.

Figure 3.1 Flow of studies through the review



3.2 Brief overview of reviews

3.2.1 Publication rate and population groups

There has been a sharp rise in review activity on screen-based activities and the mental health of CYP, with 69 of the 82 reviews published since 2014; 30 of which were also published in the last two years: 2017 and 2018 (see Figure 3.2). We found that fifty-seven reviews focused solely on CYP (i.e. people up to the age of 25), while the remaining twenty-five reviews considered evidence from populations of any age group (see Figure 3.3).

Figure 3.2 Date of publication (n=82)

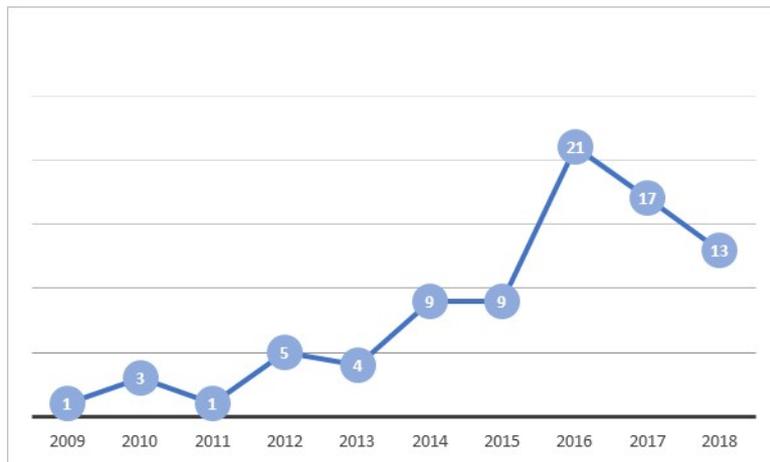
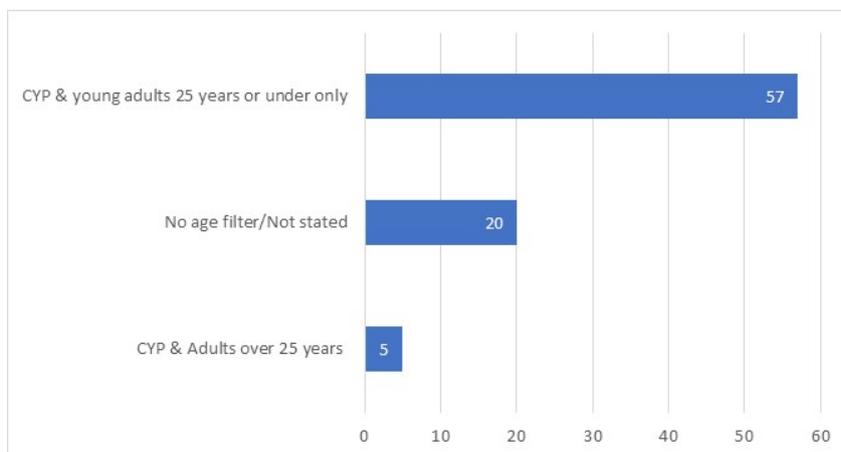


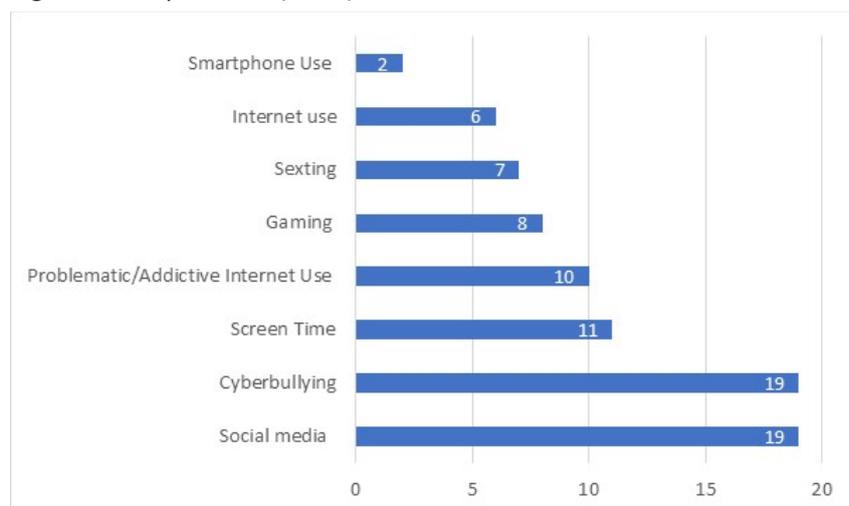
Figure 3.3 Population age groups (n=82)



3.2.2 Topic focus

Drawing on the initial conceptual framework outlined in Section 1.3, the 82 reviews were grouped according to their topic foci (see Figure 3.4). We found that while reviews cut across different aspects of screen-based activities, the concentration of review activity was focused on social media (n=19) and cyberbullying (n=19). Reviews also investigated screen time (n=11), internet use (n=6) and problematic/addictive internet use (n=10), gaming, including e-gaming and gaming addiction (n=8), sexting (n=7) and smartphone use (n=2).

Figure 3.4 Topic focus (n=82)



3.2.3 Aims of included reviews

The primary aim of most of the reviews was to investigate the associations between screen-based activities and mental health and psychosocial outcomes (n=75), drawing mainly on quantitative cross-sectional survey data. Fewer reviews attempted to delineate the risk factors (n=6) or consequences (n=11) of screen-based activities by conducting individual syntheses of longitudinal data. Although some reviews narrowed their focus to specific outcomes (e.g. depression and anxiety or suicide and self-harm), most reviews attempted to explore the breadth of possible mental health and psychosocial impacts measured in primary studies. Only four systematic reviews conducted a qualitative evidence synthesis exploring CYP views on engagement with screen-based activities; three of which focused exclusively on CYP views.

The reviews are explored in more detail in relation to each topic focus in the following sections: 3.3 Screen time; 3.4 Internet use; 3.5 Problematic/addictive internet use; 3.6 Social media; 3.7 Gaming; 3.8 Cyberbullying; 3.9. Sexting and 3.10 Smartphone use.

3.3 Screen time

3.3.1 Key findings

- **Number of reviews:** Eleven reviews on screen time were included.
- **Review aims:** Reviews examined associations (n=9), and longitudinal risk factors (n=1) and consequences (n=7) of screen time; one review explored CYP views.
- **Population:** All the reviews focused exclusively on CYP.
- **Volume of evidence:** The size of the evidence base varied greatly from reviews with less than 20 to over two hundred studies.
- **Type of synthesis:** Only two reviews employed meta-analysis despite reasonable sample sizes in primary studies.
- **Outcome focus:** A wide range of outcome measures has been explored in relation to screen time; with depression, self-esteem and behavioural outcomes the most frequently reported.
- **Quality of reviews:** of the ten primarily quantitative reviews suitable for critical appraisal, eight were classified as high quality and two were classified as medium quality.

3.3.2 Introduction

This section describes the eleven reviews identified on screen time. Screen time was understood to be defined and measured in two key ways. Some reviews measured a broad range of sedentary behaviours of which some were screen-based sedentary behaviours (e.g. reading, watching TV non-exercise-based video gaming, smartphone use), while others focused specifically on 'screen time' sedentary based behaviour only.

3.3.3 Aims of included reviews¹

Of the 11 reviews, nine examined associations between screen time and mental health and psychosocial outcomes. Seven reviews also examined the longitudinal consequences of screen time; and one review explored risk factors associated with screen time, also longitudinally. Only one review synthesised qualitative data to explore CYP's and family members perceptions of barriers to, and facilitators of, reducing screen time.

3.3.4 Review characteristics

The scope of reviews was relatively broad. All eleven focused on CYP only (rather than a wider age range), none limited studies by geographical location, and seven reviews reported no restrictions in terms of other participant characteristics. Of the remaining four reviews, one explored participants with behavioural and emotional difficulties and three examined participants classified as 'healthy'. In terms of the volume of studies synthesised, two reviews evaluated over two hundred primary studies, two between ninety and 100, three between 20 and forty, and four less than 20. Most of the reviews searched from database inception or pre-1950s (n=8); of the three remaining reviews, one searched from 2001, one from 2010 and one did not state the review search dates. Of the ten quantitative reviews, most employed a summative synthesis (n=8). One review employed a meta-analysis and one review employed a combination of summative synthesis and meta-analysis. The review of people's views conducted a thematic synthesis to identify themes from qualitative data on the barriers and facilitators to reducing CYP screen time.

The reviews' characteristics are summarised below in Table 3.3.1. A table describing the characteristics of each review is available in Appendix 3.2.

Table 3.3.1: Summary of review characteristics for screen time

Characteristics of screen time reviews (n=11)	
Geographical location	<ul style="list-style-type: none"> • No limits (11)
Study design filter	<ul style="list-style-type: none"> • Quantitative (9) • Qualitative (1) • Mixed (1)
Age	<ul style="list-style-type: none"> • CYP (11)
Other participant characteristics	<ul style="list-style-type: none"> • No restrictions (7) • CYP with behavioural and emotional difficulties (1) • Healthy (3)
Search start-date	<ul style="list-style-type: none"> • Database inception (6) • Pre-1950s (2) • 2001 (1) • 2010 (1) • Not stated (1)

¹Not mutually exclusive as some reviews had more than one aim

Characteristics of screen time reviews (n=11)	
No of primary studies	<ul style="list-style-type: none"> • More than 200 (2) • Ninety to 100 (2) • Twenty to forty (3) • Less than twenty (4)
Type of synthesis	<ul style="list-style-type: none"> • Summative synthesis (8) • Meta-analysis (1) • Summative synthesis and meta-analysis (1) • Qualitative (1)

3.3.5 Outcomes

Ten of the eleven reviews reported outcomes on the relationship between screen time and mental health and psychosocial wellbeing. We present the descriptive overview of the outcomes reported in the reviews by the type of data examined: i.e. 'associations with screen time' (which can include reviews reporting cross-sectional associations or a mixture of cross-sectional associations and longitudinal data in a single synthesis for each outcome), 'longitudinal risk factors (precursors) only' and 'longitudinal consequences' only. See Table 3.3.2 for the type and frequency of outcomes examined.²

Associations with screen time (n=9)

In terms of mental health outcomes, measures of depression were reported across six of the nine reviews measuring associations. Other mental health outcomes (e.g. loneliness, aggression/hostility, ADHD, suicidality, anxiety) were observed less frequently, in one or two reviews only. Psychosocial outcomes were also synthesised, with behavioural issues (often unspecified) and pro-social conduct (e.g. behaviour that benefits other people or society as a whole) and self-esteem reported across five separate reviews. Demographic measures were investigated in four reviews; school measures were assessed in two reviews and parenting/family factors in one review.

Longitudinal data examining risk factors (precursors) to screen time (n=1)

Only one review examined risk factors (precursors) to screen time; in this review depression was the single outcome explored.

Longitudinal data examining consequences of screen time (n=7)

Of the seven reviews examining long-term consequences of screen time, depression was the most common mental health outcome assessed (n=4). Psychosocial outcomes were also synthesised with behavioural/and pro-social conduct being the most commonly assessed (n=5), followed by measures of self-esteem (n=4) in line with the cross-sectional/mixed associations data. Measures of wellbeing/life satisfaction, social support/social skills and peer problems/bullying were also assessed in one or two reviews each. The longitudinal relationship between screen time and individual demographics (n=3), school (n=2) and parenting/family factors (n=1) was also explored in reviews.

² all studies recruited CYP populations hence no separate column for this population as in the other sections.

Table 3.3.2: Summary of outcome measures across screen time reviews, by type of data*

Outcomes	Associations with screen time (n=9)	Longitudinal risk factors of screen time (n=1)	Longitudinal consequences of screen time (n=7)
Mental Health outcomes			
Depression	6	1	4
Anxiety	2	0	2
Hostility/aggression	1	0	2
Suicidality	1	0	0
ADHD	1	0	1
Psychosocial outcomes			
Behavioural and pro-social conduct (general/unspecified)	5	0	5
Self-esteem	5	0	4
Wellbeing/life satisfaction	3	0	3
Social support/social skills	2	0	1
Loneliness	1	0	0
Stress/distress	1	0	0
Peer problems/bullying	1	0	2
Contextual factors			
Demographics	4	0	3
School factors	2	0	2
Parenting/family factors	1	0	1

*Not mutually exclusive as reviews investigate more than one outcome

3.3.6 Quality of included reviews

Ten of the eleven reviews were suitable for critical appraisal³. Overall, the reviews were classified as either high (n=8) or medium quality (n=two). None of the reviews were classified as low quality.

When exploring risk of bias within individual domains we found:

- **Low risk of bias** was identified in **seven domains** as most reviews:
 - reported an explicit aim/question and inclusion criteria (n=10)
 - reported reliable methods of duplicate data screening (n=7)
 - reported reliable methods of duplicate data extraction (n=6)
 - provide a full description of the included studies (n=7)
 - conducted quality appraisal (n=8)
 - reported conflicts of interest (n=7)
- **Unclear/moderate risk of bias** was identified in **four domains** as not all reviews:
 - referenced an existing protocol (n=5)
 - employed a fully comprehensive search strategy (n=6)
 - included references when reporting their reasons for excluding studies (n=8)
 - adequately reflected on the quality of the evidence base when interpreting the findings (n=6)

³ The qualitative evidence synthesis of CYP's views was not critically appraised. See section 6.5. for further details.

- **High risk of bias** was identified in a further **two domains** as reviews failed to:
 - provide a rationale for study design eligibility criteria (n=7)
 - provide funding details of included studies (n=10)

For the two reviews that employed meta-analyses, both were conducted appropriately and had low heterogeneity or examined sources of bias including publication bias; only one of these reviews however examined risk of bias as a source of heterogeneity. Quality assessment ratings for the reviews of screen time are shown in Appendix 3.2.

3.4 Internet use

3.4.1 Key findings

- **Number of reviews:** Six reviews on internet use were included.
- **Review aims:** All six reviews examined associations of internet use only. None explored longitudinal risk factors or consequences of internet use; or CYP experience of using the internet.
- **Population:** Only two reviews exclusively focused on CYP.
- **Volume of evidence:** The size of the evidence base varied greatly from 12 studies to 247 studies.
- **Type of synthesis:** Meta-analysis was conducted in over half the reviews (n=4).
- **Outcome focus:** A small range of mental health and psychosocial outcomes was measured; the most frequently reported were depression and loneliness.
- **Quality of reviews:** The reviews were classified as either low (n=4) or medium (n=2) quality. None of the reviews were classified as high quality.

3.4.2 Introduction

This section of the report describes the six reviews on internet use. Overall, reviews examined in this section focused on any type of internet use; reviews on excessive or problematic use are described separately in Section 3.5. The reviews did not explicitly define 'the internet' or 'the web' but assumed a shared knowledge and understanding of the technology being referred to. Some reviews narrowed their focus to 'computer mediated communication' and how people maintain social contact via the internet (e.g. email, forums, virtual worlds; in some instances, crossing over with but not confined to communication via social media). Other reviews did not differentiate between different types of online user engagement.

3.4.3 Aims of included reviews

All six reviews explored the association between internet use and mental health and psychosocial outcomes. None of the reviews explored the risk factors (precursors) or consequences of internet use using longitudinal study designs or conducted a qualitative evidence synthesis of people's views about internet use.

3.4.4 Review characteristics

The reviews applied different age group eligibility criteria for including studies; two specified a focus on CYP of differing age groups and four examined internet use across age groups. None of the reviews limited their studies by geographical location. Those at risk of suicide or self-harm were also targeted in one review.

The date range of searches undertaken by reviews varied. Two reviews did not specify their search date parameters, one of which only stated searching within the 'last two decades'. Two reviews searched from 1990 and a further two from 'database inception'. The number of included studies in each review also varied greatly and range from 12 to 247, with three reviews including between 20-50 studies. The reviews were split in terms of synthesis, with three conducting a meta-analysis and three a summative synthesis.

The review characteristics are summarised below in Table 3.4.1. A table describing the characteristics of each review is available in Appendix 3.3.

Table 3.4.1: Summary of review characteristics for internet use

Characteristics of all internet use reviews (n=6)		Characteristics of reviews that sampled CYP only (n=2)
Geographical location	<ul style="list-style-type: none"> No limits (6) 	<ul style="list-style-type: none"> No limits (2)
Study design filter	<ul style="list-style-type: none"> No limits (6) 	<ul style="list-style-type: none"> No limits (3)
Age	<ul style="list-style-type: none"> CYP (2) No limits (4) 	N/A
Other participant characteristics	<ul style="list-style-type: none"> No restrictions (5) CYP mental health issues (1) 	<ul style="list-style-type: none"> No restrictions (1) CYP mental health issues (1)
Search start-date	<ul style="list-style-type: none"> Database inception (2) 1990 (1) 1991 (1) Not stated (2) 	<ul style="list-style-type: none"> 1991 (1) Not stated (1)
No of primary studies	<ul style="list-style-type: none"> More than 200 (1) twenty to fifty (3) Less than twenty (2) 	<ul style="list-style-type: none"> Less than twenty (2)
Type of synthesis	<ul style="list-style-type: none"> Summative synthesis (3) Meta-analysis (3) 	<ul style="list-style-type: none"> Summative synthesis (2)

3.4.5 Outcomes

All six reviews reported outcomes on the relationship between internet use and mental health and psychosocial wellbeing. We present the descriptive overview of the outcomes reported in the reviews by the type of data examined: i.e. 'associations with internet use' (which can include reviews reporting cross-sectional associations or a mixture of cross-sectional associations and longitudinal data in a single synthesis for each outcome). See Table 3.4.2 for the type and frequency of outcomes examined both overall and for CYP populations.

Associations with internet use (n=6)

The reviews of internet use examined its relationship with common mental health and psychosocial outcomes. Four reviews assessed the association between internet use and depression, three on loneliness, two on anxiety and one on self-harm and suicide. Internet use and body image and eating concerns was also examined in one review. Other psychosocial outcomes included the effect of general internet use on CYP's support network and levels of social connectedness (n=2), stress and distress levels (n=1), overall life satisfaction and wellbeing (n=1) and self-esteem (n=1). Two reviews measured demographics and one review also examined the relationship between social anxiety and internet use factors such as feelings of comfort and time spent online.

Focusing on the CYP populations only, measures were reported in one or two reviews each (see table 3.4.2).

Table 3.4.2: Summary of outcome measures across internet use review, by type of data

Outcomes	Associations of internet use (n=6)
N all reviews (CYP only)	
Mental health outcomes	
Depression	4 (2)
Anxiety	2 (1)
Self-harm/suicidal	1 (1)
Body Image / eating disorders	1
Psychosocial outcomes	
Loneliness	3 (1)
Stress/distress	1 (1)
Social support/social skills/social connectedness	2 (2)
Wellbeing/life satisfaction	1
Self-esteem	1
Contextual factors	
Demographics	2 (1)
Internet use factors	1

3.4.6 Quality of included reviews

All six reviews were critically appraised. Two reviews were classified as medium quality and four reviews were classified as low quality. None of the reviews were of high quality. When exploring within individual domains we found:

- **Low risk of bias** was identified in **one domain** as the majority of reviews:
 - o reported an explicit aim/research question and inclusion criteria (n=6)
- **Unclear/moderate risk of bias** was identified in **three domains** as not all reviews:
 - o employed a fully comprehensive search strategy (n=5)
 - o provided a full description of the included studies (n=4)
 - o reported conflict of interests (n=3)
- **High risk of bias** was identified in the remaining **eight domains** as reviews failed to:
 - o refer to an existing protocol (n=5)
 - o provide a rationale for study design eligibility criteria (n=6)
 - o conduct duplicate screening (n=5)
 - o conduct duplicate data extraction (n=5)
 - o to transparently report reasons for excluding studies (n=5)
 - o provide funding details of included studies (n=6)
 - o conduct any form of critical appraisal (n=5)
 - o reflect on the quality of the evidence base when interpreting the findings (n=4)

Of the three reviews which conducted a meta-analysis, all were conducted appropriately and explored heterogeneity but only two explored publication bias and only one considered quality when exploring heterogeneity in findings. Quality assessment ratings for the reviews of internet use are shown in Appendix 3.3.

3.5 Problematic/addictive internet use

3.5.1 Key findings

- **Number of reviews:** Ten reviews on problematic/addictive internet use were included.
- **Review aims:** Reviews examined associations (n=8) longitudinal risk factors (n=2) and consequences (n=1) of problematic / addictive internet use. None conducted a qualitative evidence synthesis of CYP's views.
- **Population:** Only four of the 10 reviews focused exclusively on CYP.
- **Volume of evidence:** Reviews were fairly small with only two including more than thirty studies.
- **Type of synthesis:** Half of the reviews employed a meta-analysis.
- **Outcome focus:** Anxiety and depression were the most frequently measured mental health outcomes.
- **Quality of reviews:** Most reviews were classified as either medium quality (n=6) or high quality (n=2). Two were classified as low quality

3.5.2 Introduction

This section of the report describes the eleven reviews on problematic internet use and internet addiction. Most of the reviews cited the lack of formal recognition of internet addiction as a psychiatric disorder in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and International Classification of Diseases-11. In the absence of agreed diagnostic criteria review authors often relied on primary studies to establish the presence of problematic internet use internet addition. To achieve this, they often included primary studies which had used published tools, such as the: Problematic and Risky Internet Use Screening Scale (PRIUS); Diagnostic Criteria of Internet Addiction for College Students (DC-IA-C); Chen Internet Addiction Scale (CIAS); and Internet Addiction Test. However, in some cases, it was unclear how studies had determined when the use of the internet had become problematic or addictive.

3.5.3 Aims of included reviews

Of the ten reviews that investigated problematic/addictive internet use and mental health and psychosocial outcomes, eight examined associations. Only two reviews examined relationships longitudinally and of these, both explored mental health risk factors to problematic/addictive internet use and one also explored the mental health consequences of problematic/addictive internet use. None of the reviews conducted a qualitative evidence synthesis of people's views about problematic/addictive internet use.

3.5.4 Review characteristics

None of the 10 reviews applied limited their studies by geographical location. Four reviews focused on CYP only; one review additionally included adults and the remaining five reviews did not set any limits for population age targets. Six reviews reported no restrictions in terms of other participant characteristics; of the remaining four reviews, one each explored participants with mental health issues (suicide or self-harm ideation), healthy participants, participants with and without internet addiction and participants of Korean ethnicity. Five reviews made no restrictions in terms of how far back to search for electronic papers or searched from database inception; two reviews searched from the 1990s (one from 1999 only); two from 2002 onwards and one from 2011 onwards. In terms of the volume of studies synthesised, two reviews evaluated over 50 primary studies, three

examined between 20 and 29; three between 12 and 15 and two less than 10 studies each. Five reviews employed a meta-analysis to synthesise the data; the remaining five reviews employed a summative synthesis.

The review characteristics are summarised below in Table 3.5.1. A table describing the characteristics of each review is available in Appendix 3.4.

Table 3.5.1: Summary of review characteristics for problematic/addictive internet use

Characteristics of all problematic/addictive internet reviews (n=11)	Characteristics of reviews that sampled CYP only (n=4)	
Geographical location	<ul style="list-style-type: none"> No limits (10) 	<ul style="list-style-type: none"> No limits (4)
Study design filter	<ul style="list-style-type: none"> Quantitative (9) Mixed methods (1) 	<ul style="list-style-type: none"> Quantitative (3) Mixed methods (1)
Age	<ul style="list-style-type: none"> No Limits (5) CYP (4) Children and adults (1) 	N/A
Other participant characteristics	<ul style="list-style-type: none"> No targeting (6) Mental health issues (1) Healthy (1) With and without internet addiction (1) Korean ethnicity (1) 	<ul style="list-style-type: none"> No targeting (1) Mental health issues (1) Healthy (1) With and without internet addiction (1)
Search start-date	<ul style="list-style-type: none"> No limits (5) 1990s (2) 2002 (2) 2011 (1) 	<ul style="list-style-type: none"> No limits (1) 1990s (1) 2002 (1) 2011 (1)
No of primary studies	<ul style="list-style-type: none"> Less than ten (2) Twelve to fifteen (3) Twenty to twenty-nine (3) More than 50 (2) 	<ul style="list-style-type: none"> Less than ten (1) Twenty to twenty-nine (2) More than 50 (1)
Type of synthesis	<ul style="list-style-type: none"> Summative synthesis (5) Meta-analysis (5) 	<ul style="list-style-type: none"> Summative synthesis (3) Meta-analysis (1)

3.5.5 Outcomes

All ten reviews reported findings on the relationship between screen time and mental health and psychosocial outcomes. We present the descriptive overview of the outcomes reported in the reviews by type of data examined: i.e. 'associations with problematic/addictive internet use' (which includes reviews reporting cross-sectional associations or a mixture of cross-sectional associations and longitudinal data in a single synthesis for each outcome), 'longitudinal risk factors (precursors) only' and 'longitudinal consequences' only. The type and frequency of outcomes were examined both overall and for CYP populations are presented in Table 3.5.2.

Associations with problematic/addictive internet use (n=8)

In terms of mental health outcomes, syntheses of depression, and anxiety were most frequent (n=6), followed by hostility/aggression and ADHD symptoms (both n=4). Two reviews each assessed obsessive/compulsive symptoms and suicidality or self-harm. Other mental health issues were reported in three reviews. Of the psychosocial outcomes, measures of self-esteem, wellbeing/life satisfaction and loneliness were the associations with problematic/addictive internet use evaluated most frequently (n=3). The remaining psychosocial outcomes were measured by two reviews each

(social support/skills and peer problems/bullying) or a single review (substance misuse). Key contextual factors explored in relationship to problematic/addictive internet use included demographics (n=3) and personality traits (n=3).

Focusing on the CYP populations only, measures were reported in one or two reviews each (see Table 3.5.2).

Longitudinal data examining risk factors (precursors) to problematic/addictive internet use (n=2)

Risk factors were either assessed in both reviews (depression, anxiety, hostility/aggression and ADHD symptoms for mental health outcomes; parenting/family factors, school factors, loneliness for the health and wellbeing factors) or in one review only (obsessive/compulsive tendencies for the psychopathological measures; demographics, substance misuse, personality trait, self-esteem, wellbeing/life satisfaction, social support/skills, peer problems/bullying for the health and wellbeing factors).

Longitudinal data examining consequences of problematic/addictive internet use (n=1)

Depression was the only outcome assessed in the single reviews that explored consequences of problematic/addictive internet use.

Table 3.5.2: summary of outcome measures across problematic/addictive internet use reviews, by type of data

Outcomes	Associations with problematic/addictive internet use (n=8)	Longitudinal risk factors of problematic/addictive internet use (n=2)	Longitudinal consequences of problematic/addictive internet use (n=1)
N all reviews (CYP only)			
Mental health outcomes			
Depression	6(1)	2(2)	1
Anxiety	6(1)	2(2)	0
Hostility/aggression	4(1)	2(2)	0
Obsessive/compulsive	2	1(1)	0
ADHD Symptoms/self-regulation	4	2(2)	0
Suicidality/self-harm	2(1)	0	0
Alexithymia	1	0	0
Psychosocial outcomes			
Self-esteem	3(1)	1(1)	0
Wellbeing/life satisfaction	3(1)	1(1)	0
Social support/skills	2(1)	1(1)	0
Loneliness	3(1)	2(2)	0
Peer problems/bullying	2(1)	1(1)	0
Substance misuse	1	1(1)	0
Stress/Distress	1	0	0
Contextual factors			
Demographics	3(1)	1 (1)	0
Personality traits	3	1(1)	0

Outcomes	Associations with problematic/addictive internet use (n=8)	Longitudinal risk factors of problematic/addictive internet use (n=2)	Longitudinal consequences of problematic/addictive internet use (n=1)
Parenting/family factors	2(1)	2(1)	0
School factors	1	2(1)	0

3.5.6 Quality of included reviews

All ten problematic/addictive internet use reviews were critically appraised. Most reviews were classified as either medium quality (n=6) or high quality (n=2). Two were classified as low quality. When exploring risk of bias within individual domains we found:

- **Low risk of bias** was identified in **three domains** as most reviews reported
 - o an explicit aim/research question and inclusion criteria (n=10)
 - o reliable methods of duplicate data extraction (n=6)
 - o conflicts of interests (n=9)
- **Unclear/moderate risk of bias** was identified in **four domains** as not all reviews:
 - o employed a fully comprehensive search strategy (n=8)
 - o included references when reporting their reasons for excluding studies (n=8)
 - o provided a full description of the included studies (n=7)
 - o adequately reflected on the quality of the evidence base when interpreting the findings (n=6)
- **High risk of bias** was identified in the remaining **five domains** as reviews failed to:
 - o refer to an existing protocol (n=8)
 - o provide a rationale for study design eligibility criteria (n=8)
 - o conduct duplicate screening (n=6)
 - o provide funding details of included studies (n=10)
 - o conduct any form of quality appraisal (n=7)

For the five reviews that employed a meta-analysis, all were conducted appropriately. Three of the five explored sources of heterogeneity and publication bias; however, only one examined risk of bias as a source of heterogeneity. Quality assessment ratings for reviews of problematic/addictive internet use are shown in Appendix 3.4.

3.6 Social media

3.6.1 Key findings

- **Number of reviews:** Nineteen reviews on social media were included.
- **Review aims:** Reviews examined associations (n=18), longitudinal risk factors (n=1) and consequences (n=1) of social media; one review explored CYP views.
- **Population:** Just over half of the reviews (n=11) focused on CYP exclusively.
- **Volume of evidence:** The size of the evidence base in each review ranged widely from eight to 70 studies.
- **Type of synthesis:** Very few reviews conducted meta-analyses (n=3).

- **Outcome focus:** Across all 19 reviews, anxiety and social support/social connectedness were the mental health outcomes measured most frequently.
- **Quality of reviews:** Of the 18 primarily quantitative reviews suitable for critical appraisal, five were classified as high quality, six as medium quality and seven as low quality.

3.6.2 Introduction

This section of the report describes the 19 reviews on social media. Reviews focused on describing the functionality of social media platforms to differentiate them from other types of online activities. These included, but were not limited to, online and mobile applications which enable participants to generate a unique user profile, maintain social contact and share information with others in real time, often with broad and dispersed audiences (e.g. live streaming).

3.6.3 Aims of included reviews

Most reviews examined the relationship between social media and mental health and psychosocial outcomes (n=18); one of which also explored the risk factors and consequences of engagement in social media drawing on longitudinal data. The remaining review explored young people's experiences of using social media to support their psychological wellbeing.

3.6.4 Review characteristics

The reviews generally adopted broad geographical and study design eligibility criteria. One review limited their scope to studies from high income countries and two reviews reported that they were interested in quantitative designs or excluded studies with qualitative data. Eleven of the 19 reviews included studies investigating CYP only; of the remaining eight reviews, four reported they included populations of any age and four did not specify an age range. However, reviews of mixed age populations were dominated by studies investigating adolescents and young people. Of the systematic reviews focused exclusively on CYP, two were interested in CYP with existing mental health issues, five on non-clinical populations, two focused on subsets of CYP (e.g. adolescent mothers, indigenous populations) and ten did not specify.

The reviews searched from different dates, ranging from 1980 to the early 2000s, and in some cases based on the inception dates of individual databases. Only two reviews provided a rationale for their search date parameters, both based on technological advances (e.g. the inception of Facebook and the advent of Web 2.0). Typically reviews sought studies published within the last ten years of conducting their review. The size of the evidence base in each review ranged from eight to 70 studies, often reflecting the scope of the review, with those focusing on more than one mental health outcome or a broader age range including a larger sample of studies. Only four reviews conducted a meta-analysis, the remaining reviews combined data to produce summative statements (N=14) or conducted a thematic synthesis of qualitative findings (n=1).

The review characteristics are summarised below in Table 3.6.1. A table describing the characteristics of each review is available in Appendix 3.5.

Table 3.6.1: Summary of review characteristics for social media

Characteristics of all social media reviews (n=19)		Characteristics of reviews that sampled CYP only (n=11)
Geographical location	<ul style="list-style-type: none"> No limits (18) OECD countries (1) 	<ul style="list-style-type: none"> No limits (10) OECD countries (1)
Study design filter	<ul style="list-style-type: none"> No filter (19) 	<ul style="list-style-type: none"> No filter (11)
Age	<ul style="list-style-type: none"> No limits (4) CYP (11) Children and adults (4) 	N/A
Other participant characteristics	<ul style="list-style-type: none"> No targeting (10) Mental health issues (2) Healthy (5) Other characteristics (2) 	<ul style="list-style-type: none"> No targeting (4) Mental health issues (2) Healthy (4) Other characteristics (2)
Search start-date	<ul style="list-style-type: none"> No limits (11) 1980 (1) 2003-2016 (7) 	<ul style="list-style-type: none"> No limits (7) 1980 (1) 2003-2016 (3)
No of primary studies	<ul style="list-style-type: none"> Sixty to 100 (2) Forty to sixty (1) Twenty to forty (10) Ten than twenty (5) Less than ten (1) 	<ul style="list-style-type: none"> Sixty to 100 (0) Forty to sixty (1) Twenty to forty (5) Ten than twenty (4) Less than ten (1)
Type of synthesis	<ul style="list-style-type: none"> Summative synthesis (14) Meta-analysis (4) Qualitative (1) 	<ul style="list-style-type: none"> Summative synthesis (8) Meta-analysis (2) Qualitative (1)

3.6.5 Outcomes

Eighteen of the 19 reviews reported outcomes on the relationship between social media and mental health and psychosocial wellbeing. We present the descriptive overview of the outcomes reported in the reviews by type of data examined: i.e. 'associations with social media use' (which can include reviews reporting cross-sectional associations or a mixture of cross-sectional associations and longitudinal data in a single synthesis for each outcome), 'longitudinal risk factors (precursors) only' and 'longitudinal consequences' only. The type and frequency of outcomes examined, both overall and for CYP populations are presented in Table 3.6.2.

Associations with social media (n=18)

Anxiety (n=6) and depression (n=5) were the most commonly reported mental health outcomes. Two reviews each also explored: self-harm and suicidal behaviours; body image and eating disorder issues; and substance misuse and risky behaviours. Other mental health presentations such as mania, obsessive/compulsive tendencies, hostility and aggression also featured in single reviews. Social support and connectedness (n=7) and overall wellbeing and life satisfaction (n=5) were the most frequently reported psychosocial outcomes, followed by self-esteem (n=4) and loneliness (n=3). Other outcomes included social capital, identity development, peer problems including bullying and stress (see Table 3.6.2). Reviews also investigated associations between contextual factors related to social media use (e.g. frequency of time spent online, history of social media, size of social network group, n=6), personality traits, population demographics and mental health and psychosocial outcomes.

Focusing on the CYP populations only, measures were reported in one to four reviews each (see Table 3.6.2).

Longitudinal data examining risk factors (precursors) to social media use (n=1)

One review considered depression rates in CYP, as a precursor to social media use.

Longitudinal data examining consequences of social media use (n=1)

One review synthesised longitudinal evidence on the consequences of social media use and body image concerns and disordered eating.

3.6.2 Summary of outcome measures across social media reviews, by type of data

Outcomes	Associations of social media (n=18)	Longitudinal risk factors of social media (n=1)	Longitudinal consequences of engagement in social media (n=1)
	N all reviews (CYP only)		
Mental Health Outcomes			
Anxiety	6(2)	0	0
Depression	5(2)	1(1)	0
Self-harm/suicidality	2(2)	0	0
Body image/disordered eating	2(1)	0	1
Substance misuse/risky behaviours	2(1)	0	0
Hostility/aggression	1(1)	0	0
Obsessive/compulsive	1(1)	0	0
Psychosis/schizoid tendencies	1(1)	0	0
Bi-polar/mania	1	0	0
Attachment issues	1	0	0
Psychosocial outcomes			
Social support/social connectedness	7(4)	0	0
Wellbeing/life satisfaction	5(2)	0	0
Self-esteem	4(1)	0	0
Loneliness	3(2)	0	0
Social capital	3(2)	0	0
Identity development	3(3)	0	0
Peer problems/bullying	2(2)	0	0
Stress/distress	1(0)	0	0
Contextual factors			
Social media use factors	6(3)	0	0
Personality traits	4(1)	0	0
Demographics	3(2)	0	0

3.6.6 Quality of included reviews

Eighteen of the 19 reviews were suitable for critical appraisal⁴. The quality of reviews varied. Five were classified as high quality, six as medium quality and seven as low quality. When exploring risk of bias within individual domains we found:

Low risk of bias was identified in **two domains** as most reviews:

- reported an explicit aim/research question and inclusion criteria (n=19)
- conducted quality appraisal (n=11)

- **Unclear/moderate risk of bias** was identified in **six domains** as not all reviews:

- employed a fully comprehensive search strategy (n=14)
- conducted duplicate screening (n=10)
- included references when reporting their reasons for excluding studies (n=10)
- provided a full description of the included studies (n=7)
- reported conflict of interests (n=9)
- adequately reflected on the quality of the evidence base when interpreting the findings (n=9)

- **High risk of bias** was identified in the remaining **four domains** as reviews failed to:

- refer to an existing protocol (n=12)
- provide a rationale for study design eligibility criteria (n=16)
- conduct duplicate data extraction (n=13)
- provide funding details of included studies (n=18)

Of the four reviews which conducted a meta-analysis, all were conducted appropriately and explored heterogeneity and publication bias, but none assessed the potential impact of quality ratings to explore variation of findings in the meta-analysis. Quality assessment ratings are shown in Appendix 3.5.

3.7 Gaming

3.7.1 Key findings

- **Number of reviews:** Eight reviews on gaming were included.
- **Review aims:** Reviews examined associations (n=8) longitudinal risk factors (n=2) and consequences (n=2) of gaming. None conducted a qualitative evidence synthesis of CYP's views.
- **Population:** Most of the reviews focused on CYP only (n=5).
- **Volume of evidence:** The size of the evidence base varied greatly from reviews with less than 20 to over 100 studies.
- **Type of synthesis:** Despite several relatively large reviews with more than thirty studies (n=6), only one review employed a meta-analysis
- **Outcome focus:** Across all eight reviews, anxiety and depression were the mental health outcomes measured most frequently.
- **Quality of reviews:** All reviews were classified as low quality.

⁴ The qualitative evidence synthesis of CYP's views was not critically appraised. See section 6.5. for further details.

3.7.2 Introduction

This section describes the eight reviews on gaming. Five of the eight reviews were specifically concerned with internet gaming disorder, two with online gaming generally and one specifically focused on multiplayer online role-playing gaming. In a similar way to that found in problematic internet use, review authors reflected on the lack of agreed diagnostic criteria to assess internet gaming disorder (at the time of publication).

3.7.3 Aims of included reviews

The majority of reviews examined associations between gaming and mental health and psychosocial wellbeing; only three reviews examined relationships longitudinally, and of these, two explored both risk factors and consequences of gaming, and one explored consequences only. No qualitative evidence syntheses of CYP views on gaming were located.

3.7.4 Review characteristics

None of the reviews placed geographical location limits on studies eligible for inclusion in their reviews. Most of the reviews focused on CYP only (n=5); the remaining three reviews did not set any limits for population. Seven reviews reported no restrictions in terms of other participant characteristics; one review specified that the participants be healthy. One review each searched for electronic papers from database inception, 1960s, and 1990s and three reviews searched from 2000s (two reviews did not state the search start date). Seven reviews reported their search end-date, ranging from 2012 to 2016. In terms of the volume of studies synthesised, two reviews were large, including over 100 studies (one of these evaluated over 200 references); three examined fifty or more studies, one 30 or more, and two less than 20. One review employed a meta-analysis; the remaining reviews conducted a summative synthesis.

The review characteristics are summarised below in Table 3.7.1. A table describing the characteristics of each review is available in Appendix 3.6.

Table 3.7.1 Summary of review characteristics for gaming.

Characteristics of all gaming reviews (n=8)		Characteristics of reviews that sampled CYP only (n=5)
Geographical location	<ul style="list-style-type: none"> No limits (8) 	<ul style="list-style-type: none"> No limits (5)
Study design filter	<ul style="list-style-type: none"> Quantitative only (3) Mixed designs (2) No limits (3) 	<ul style="list-style-type: none"> Quantitative only (2) Mixed designs (1) No limits (2)
Age	<ul style="list-style-type: none"> Not stated (3) CYP (5) 	N/A
Other participant characteristics	<ul style="list-style-type: none"> No restrictions (7) Healthy (1) 	<ul style="list-style-type: none"> No restrictions (4) Healthy (1)
Search start date	<ul style="list-style-type: none"> Data base inception (1) Not specified (2) 1960s (1) 1990s (1) 2000s (3) 	<ul style="list-style-type: none"> Not specified (2) 1990s (1) 2000s (2)
No of primary studies	<ul style="list-style-type: none"> Less than twenty (2) 	<ul style="list-style-type: none"> Less than twenty (2)

Characteristics of all gaming reviews (n=8)	Characteristics of reviews that sampled CYP only (n=5)
<ul style="list-style-type: none"> • Thirty to fifty (1) • Fifty to one hundred (3) • 100 to 200 (1) • More than 200 (1) 	<ul style="list-style-type: none"> • Thirty to fifty (1) • 100 to 200 (1) • More than 200 (1)
Type of synthesis <ul style="list-style-type: none"> • Summative synthesis (7) • Meta-analysis (1) 	<ul style="list-style-type: none"> • Summative synthesis (4) • Meta-analysis (1)

3.7.5 Outcomes

All eight reviews reported outcomes on the relationship between gaming and mental health and psychosocial wellbeing. We present the descriptive overview of the outcomes reported in the reviews by type of data examined: i.e. 'associations with gaming' (which can include reviews reporting cross-sectional associations or a mixture of cross-sectional associations and longitudinal data in a single synthesis for each outcome), 'longitudinal risk factors' and 'longitudinal consequences only'. A range of outcomes was examined: see Table 3.7.2 for type and frequency, both overall and for CYP populations.

Associations with gaming (n=8)

In terms of mental health outcomes, measures of depression and anxiety were most frequent (n=6) followed by measures of ADHD symptoms (n=5) and hostility/aggression (n=4). The remaining mental health outcomes were present less frequently; three reviews examined suicidality/self-harm, three examined patho/physiology response (e.g. psychological and physiological response to gaming) and two examined neurobiological responses to gaming.

All of the psychosocial outcomes were reported in at least four of the reviews; some outcomes were reported in five (social support/skills) or six (loneliness) reviews. In terms of contextual factors, game type and measures of escapism were most commonly reported (n=5), followed by gaming to meet personal needs (such as esteem-based needs) (n=4) and beliefs (such as attitudes) related to gaming (n=3).

Patterns were similar among the reviews examining CYP populations only with psychopathology measures of depression, anxiety and ADHD symptoms being measured most frequently. Similarly, the following psychosocial and contextual measures were assessed most frequently across the reviews that examined CYP populations exclusively; demographics, school factors and parenting/family factors (four times each) or social supports/skills, loneliness and stress (three times each).

Longitudinal data examining risk factors (precursors) to gaming only (n=2)

Of the two reviews examining longitudinal data, risk factors were assessed in one review each, including mental health outcomes: depression, anxiety, hostility/aggression, ADHD symptoms/self-regulation; and psychosocial outcomes: self-esteem, social support/skills, loneliness and game specific factors (e.g. game factors and behavioural beliefs) and demographics, parenting/family factors and school factors.

Longitudinal data examining consequences of gaming only (n=2)

Of the two reviews examining longitudinal data, the following health consequences of gaming were assessed in one review each: psychopathology outcomes (depression, anxiety, hostility/aggression) and health and wellbeing (parenting/family factors, school factors, substance misuse, social support/skills).

Table 3.7.2: Summary of outcome measures across gaming reviews, by type of data

Outcomes	Associations with gaming (n=8)	Longitudinal risk factors of gaming (n=2)	Longitudinal consequences of gaming (n=2)
N all reviews (CYP only)			
Mental health outcomes			
Depression	6(4)	1	1
Anxiety	6(3)	1	1
Hostility/aggression	4(2)	1	1
Suicidality	3(2)	0	0
ADHD symptoms/self-regulation	5(3)	1	0
Patho-physiology	3(1)	0	0
Neurobiology	2(1)	0	0
Psychosis/schizoid	1	0	0
Psychosocial outcomes			
Loneliness	6(3)	1	0
Social support/skills	5(3)	1	1
Self-esteem	4(2)	1	0
Wellbeing/life satisfaction	4(2)	0	0
Stress/distress	4(3)	0	0
Substance misuse	4(2)	0	1
Social Capital	1	0	0
Contextual factors			
Demographics	6(4)	1	0
Parenting/family factors	5(4)	1(1)	1(1)
School factors	6(4)	1	1
Personality traits/temperament	4(1)	0	0
Game factors (e.g. time, type)	5(2)	1	0
Behavioural beliefs (e.g. attitudes, intention)	3(1)	1	0
Escapism	5(3)	0	0
Gaming to meet needs (e.g. esteem)	4(2)	0	0

3.7.6 Quality of included reviews

All eight gaming reviews were critically appraised and classified as low quality. When exploring risk of bias within individual domains we found:

- **Low risk of bias** was identified in **one domain** as most reviews:
 - o reported an explicit aim/research question and inclusion criteria (n=7)

- **Unclear/moderate risk of bias** was identified in **two domains** as not all reviews:
 - employed a fully comprehensive search strategy (n=6)
 - reported conflict of interests (n=4)

- **High risk of bias** was identified in the remaining **seven domains** as reviews failed to:
 - refer to an existing protocol (n=8)
 - provide a rationale for study design eligibility criteria (n=6)
 - conduct duplicate screening (n=7)
 - conduct duplicate data extraction (n=8)
 - describe included studies (n=5)
 - conduct any form of quality appraisal (n=7)
 - provide funding details of included studies (n=8)

The single meta-analytic review was conducted appropriately and examined both publication bias and risk of bias as a source of heterogeneity, although other sources of heterogeneity were not explored. Quality assessment ratings for the reviews of gaming are shown in Appendix 3.7.

3.8 Cyberbullying

3.8.1 Key findings

- **Number of reviews:** Nineteen reviews on cyberbullying were included.
- **Review aims:** All 19 reviews examined associations with mental health outcomes. None explored risk factors and consequences of cyberbullying or CYP experiences of cyberbullying.
- **Population:** All but one review focused exclusively on CYP.
- **Volume of evidence:** The size of the evidence varied with reviews including from 10 to 131 studies.
- **Type of synthesis:** Over half the reviews conducted meta-analysis (n=11)
- **Outcome focus:** A wide range of outcomes measures have been explored in relation to cyberbullying, including: depression, anxiety, suicidality, substance misuse and self-esteem.
- **Quality of reviews:** Most reviews were classified as low quality (n=10). Of the remaining nine reviews, six were classified as medium and only three as high quality.

3.8.2 Introduction

This section describes the 19 systematic reviews which assessed the relationship between cyberbullying and mental health and psychosocial outcomes. Some review authors drew attention to the lack of classification of cyberbullying, as it is not in the latest version of the International Classification of Diseases (ICD-10)(World Health Organisation 2016), nor in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5)(American Psychiatric Association 2013). Thus, to date there is no consensus for a definition of cyberbullying, but instead remains an area of ongoing debate concerning the understanding and use of related terms such as 'cyberbullying', 'cyber-aggression' and 'harassment'

3.8.3 Aims of included reviews

All 19 reviews investigated the relationship between cyberbullying and mental health and psychosocial outcomes. None of the reviews explored longitudinal risk factors and consequences of cyberbullying or conducted a qualitative evidence synthesis of CYP's views about cyberbullying.

3.8.4 Review characteristics

Most of the reviews did not restrict studies by geographical location (N=15), while four reviews included studies only conducted in high income or OECD countries. Eighteen of the 19 reviews only included studies on CYP populations. Eleven reviews focused on healthy CYP; one focused on LGBTQ youth (lesbian, gay, bisexual, transsexual and questioning) and one focused on victims of bullying. The remaining seven reviews did not focus on a specific target population.

Eight reviews did not state how far back they searched for electronic papers or whether they searched from database inception. The search dates that were stated ranged from 1910 to 2018. Two reviews did not specify a date restriction. The number of included studies in the reviews ranged from ten to 131. Seven reviews included over 50 studies, six reviews included 30-49 studies and seven reviews included less than 29 studies. Twelve reviews conducted syntheses using methods of meta-analysis and eight conducted summative syntheses.

The review characteristics are summarised below in Table 3.8.4 below. A table describing the characteristics of each review is available in Appendix 3.7

Table 3.8.1 Summary of review characteristics for cyberbullying

Characteristics of all cyberbullying reviews (n=19)		Characteristics of reviews that sampled CYP only (n=18)
Geographical location	<ul style="list-style-type: none"> No limits (15) High income or OECD countries (4) 	<ul style="list-style-type: none"> No limits (14) High income or OECD countries (4)
Study design filter	<ul style="list-style-type: none"> No limits (11) Cross-sectional only (4) Cross-sectional or longitudinal (4) 	<ul style="list-style-type: none"> No limits (10) Cross-sectional (4) Cross-sectional or longitudinal (4)
Age	<ul style="list-style-type: none"> No limits (1) CYP (18) 	N/A
Other participant characteristics	<ul style="list-style-type: none"> No targeting (8) Healthy CYP (10) LGBTQ (1) Victims of bullying (1) 	<ul style="list-style-type: none"> No targeting (7) Healthy CYP (10) LGBTQ (1) Victims of bullying (1)
Search start date	<ul style="list-style-type: none"> Not stated (6) 1910 (2) 1990-2000 (6) 2000-2010 (5) 	<ul style="list-style-type: none"> Not stated (5) 1910 (2) 1990-2000 (6) 2000-2010 (5)
Number of included studies	<ul style="list-style-type: none"> Less than twenty-nine (7) Thirty to fifty (7) More than fifty (5) 	<ul style="list-style-type: none"> Less than twenty-nine (7) Thirty to fifty (6) More than fifty (5)
Types of synthesis	Summative synthesis (8) Meta-analysis (11)	Summative synthesis (8) Meta-analysis (10)

3.8.5 Outcomes

All of the reviews reported outcomes on the relationship between cyberbullying and mental health and psychosocial wellbeing. We present the descriptive overview of the outcomes reported in the reviews by type of data examined: i.e. 'associations with cyberbullying' (which can include reviews reporting cross-sectional associations or a mixture of cross-sectional associations and longitudinal data in a single synthesis for each outcome). A range of outcomes was examined (see Table 3.8.2 for type and frequency, both overall and for CYP populations).

Association with cyberbullying (n=19)

The most commonly reported mental health outcomes were measures of depression (n=14), anxiety (n=11), hostility/aggression (n=6) and suicidality (n=11). Self-harm, often linked to suicidality in the literature, was also reported in four reviews. Loneliness, ADHD/ hyperactivity and alexithymia were each reported in single reviews.

For psychosocial outcomes, self-esteem was commonly reported (n=10), followed by peer problems (n=10), substance misuse (n=6) and stress/distress (n=6). Life satisfaction (n=3) and social support featured in three and two reviews respectively. Other psychosocial outcomes such as anger, fear, isolation and loss of confidence also featured, but with less prominence in most of the reviews.

In addition to mental health and psychosocial outcomes, many of the reviews were interested in the relationship between contextual factors that might explain prevalence of victimisation and perpetration of cyberbullying such as: demographics (n=12); school factors (n=9), parenting factors (n=8 and personality traits (n=8).

When exploring outcome patterns for CYP populations specifically, the only outcome reported in a review focused on any age range was loneliness.

A summary of the outcomes reported is presented in Table 3.8.2.

Table 3.8.2: Summary of outcome measures across cyberbullying reviews, by type of data

Outcomes	Associations of cyberbullying (n=19)
N all reviews (CYP only)	
Mental health outcomes	
Depression	13(12)
Suicidality	11(11)
Anxiety	10(10)
Hostility and aggression	6(6)
Substance mis/use	6(6)
Self-harm	4(4)
ADHD symptoms/self-regulation	1(1)
Psychosocial outcomes	
Self-esteem	9(8)
Peer problems/bullying	9(8)
Substance mis/use	6(6)
Stress/distress	6(6)
Wellbeing/life satisfaction	3(3)
Social support/social skills	1(1)
Loneliness	1
Contextual factors	
Demographics	12(12)
School factors	8(7)
Parenting/family factors	7(6)
Personality traits/temperament	7(7)

3.8.6 Quality of included reviews

All 19 reviews were quality appraised using the AMSTAR 2 tool. The quality of reviews varied. Only three were classified to be of high quality, the remaining 16 reviews were judged to be of medium (6) and low quality (n=10). When exploring risk of bias within individual domains we found:

- **Low risk of bias** was identified in **four domains** as most reviews:
 - reported an explicit aim/research question and inclusion criteria (n=19)
 - employed a fully comprehensive search strategy (n=13)
 - provided a full description of the included studies (n=11)
 - reported conflicts of interest
- **Unclear/moderate risk of bias** was identified in **two domains** as not all reviews:
 - reported conflict of interests (n=4)
 - conducted duplicate data extraction (n=9)
- **High risk of bias** was identified in the remaining **seven domains** as reviews failed to:
 - refer to an existing protocol (n=17)
 - provide a rationale for study design eligibility criteria (n=12)
 - conduct duplicate screening (n=12)
 - reporting their reasons for excluding studies (n=12)
 - conduct any form of critical appraisal (n=15)
 - provide funding details of included studies (n=19)
 - reflected on the quality of the evidence base when interpreting the findings (n=12)

All of the 11 reviews that employed a meta-analysis did so appropriately. Nine of the 11 reviews explored sources of heterogeneity and publication bias and eleven examined risk of bias as a source of heterogeneity. However, eight reviews did not adequately assess the potential impact of risk of bias of individual studies on the result of the meta-analysis. Risk of bias was only discussed partially in the interpretation of the findings. Quality assessment ratings for the reviews of cyberbullying are shown in Appendix 3.7

3.9 Sexting

3.9.1 Key findings

- **Number of reviews:** Seven reviews on sexting were included.
- **Review aims:** Reviews explored associations (n=5) or CYP's views on sexting (n=2). None explored longitudinal risk factors or consequences of sexting.
- **Population:** All but one review focused exclusively on CYP.
- **Volume of evidence:** The number of studies included in each review ranged from five to 88.
- **Type of synthesis:** Meta-analysis was performed in only one review.
- **Outcome focus:** Reviews measured key mental health outcomes such as depression and anxiety, but their main focus was sexual health and other risk-taking behaviours.
- **Quality of reviews:** Of the five primarily quantitative reviews suitable for critical appraisal, three were classified as medium quality and two as low quality. None of the reviews were classified as high quality.

3.9.2 Introduction

Seven reviews with a focus on sexting were identified. A key issue that emerged from these reviews is the variability with which sexting has been defined and operationalised in research studies. Linked to this, is the subjectivity of terms used in many definitions; words such as 'erotic', 'sexually explicit' and 'sexually suggestive' mean different things to different people. There is also a conceptual debate in the literature on the nature of sexting and whether it is 'inherently problematic'.

3.9.3 Aims of included reviews

Of the seven reviews, five explored associations between sexting and mental health outcomes. Two reviews investigated the qualitative evidence base to explore CYP's views on sexting. None of the reviews explored the risk factors or consequences of sexting using longitudinal study designs.

3.9.4 Review characteristics

All but one of the reviews focused on CYP only. In the review that did not apply an age filter, the prevalence of sexting among adolescents and adults was reported separately, but the associated outcomes were not. There were no geographical inclusion criteria applied in any of the reviews. In three of the seven reviews, study design eligibility criteria were applied; two of these were restricted to qualitative data only and the other was limited to cross-sectional data. In the remaining four reviews, there was no study design filter applied, but in practice these reviews predominantly featured cross-sectional data from surveys.

The number of studies included in each review ranged from five to 88. The reviews that included a higher number of articles tended to have a broader scope, encompassing contextual factors associated with sexting and related outcomes. In five of the reviews the exact date range searched was provided. Given that sexting is a relatively new phenomenon it is perhaps unsurprising that the date ranges, where given, tended to be quite narrow. Only one of the reviews included a meta-analysis. The focus of this meta-analysis, however, was on the association between sexting and sexual risk behaviour, not mental health outcomes. Of the other reviews, three used narrative synthesis of quantitative data to produce summative statements and two conducted a thematic synthesis of qualitative findings. In one review, the data was not combined to make summative statements making the type of synthesis produced unclear.

The review characteristics are summarised below in Table 3.9.4. For information organised by review see Appendix 3.8.

Table 3.9.1 Summary of review characteristics for sexting

Characteristics of all sexting reviews (n=7)	Characteristics of reviews that sampled CYP only (n=6)
Geographical location	• No limits (7)
Age	• No Limits (1) • Children and adults (6)
Other participant characteristics	• No restrictions (7)
Study design filter	• No filter (3) • Cross-sectional (1) • Qualitative (2)

Search start date	<ul style="list-style-type: none"> • Not stated (2) • 2000 (1) • 2005 (1) • 2008 (1) • 2009 (1) • 2012 (1) 	<ul style="list-style-type: none"> • Not stated (2) • 2005 (1) • 2008 (1) • 2009 (1) • 2012 (1)
No of studies	<ul style="list-style-type: none"> • Less than ten (3) • Ten to twenty (2) • More than twenty (2) 	<ul style="list-style-type: none"> • Less than ten (3) • Ten to twenty (2) • More than twenty (1)
Type of synthesis	<ul style="list-style-type: none"> • Summative synthesis (3) • Meta-analysis (1) • Qualitative findings (2) • No synthesis (1) 	<ul style="list-style-type: none"> • Summative synthesis (2) • Meta-analysis (1) • Qualitative findings (2) • No synthesis (1)

3.9.5 Outcomes

Five reviews examined the relationship between sexting and mental health and psychosocial outcomes. We present the descriptive overview of the outcomes reported in the reviews by type of data examined: i.e. 'associations with sexting' (which includes reviews reporting cross-sectional associations or a mixture of cross-sectional associations and longitudinal data in a single synthesis for each outcome). The range of outcomes examined are presented in Table 3.9.2, both for the reviews overall and for the reviews which focus on CYP populations.

Associations with sexting (n=5)

Depression and anxiety were the most commonly reported mental health outcomes featuring in four of the five reviews. Suicidality was reported in two reviews and internet addiction, 'psychological difficulties' and 'histrionic personality symptoms' were reported in one review each. The most commonly reported psychosocial outcomes were related to sexual behaviour and to alcohol, tobacco, illicit drug use, violence and other 'deviant' behaviour. These were reported in all five of the reviews that included data on associated risk factors for sexting. Various measures of sexual behaviour were included, covering sexual practices, sexual partnerships and negative sexual health outcomes (e.g. sexually transmitted infections, unplanned pregnancy and sexual violence). The next most commonly reported psychosocial outcomes were 'stress and distress' (n=3) associated with sexting, attitudes and norms around sexting and their association with engaging in the practice. Use of technology, including measures such as 'excessive' texting and hours spent online, was included in two reviews, as were indicators of social support and social connectedness, feeling 'sad or hopeless' and experience of bullying/cyberbullying and adverse childhood events. The latter encompassed experience of childhood sexual abuse and family breakdown.

Of the three reviews that included data on contextual factors, three included socio-economic and demographic correlates of sexting - such as age, gender, ethnicity and education – and two included parental and peer-factors. 'Personality traits' were also included in three of the four reviews, such as measures of 'sensation seeking' and 'impulsivity'.

When exploring outcome patterns for across age groups, the review of CYP and adults did not report any outcomes that were not represented in the other reviews.

Table 3.9.2: Summary of outcome measures across sexting reviews, by type of data

Outcomes	Association with sexting (n=4)
N all reviews (CYP only)	
Mental health outcomes	
Depression	4(3)
Anxiety	3(2)
Suicidality	2(1)
Internet addiction	1(1)
Psychosocial outcomes	
Alcohol/tobacco/drugs/violence/'deviant' behaviour	5(4)
Sexual behaviour/sexual health	4(3)
Stress/distress	3(3)
Adverse childhood events (ACE)	2(1)
Technology use/behaviour	2(1)
Bullying/cyberbullying	3(3)
Social support/connectedness	2(2)
Sad/hopeless	2(1)
Self esteem	1(1)
Contextual factors	
Attitudes/norms to sexting	3(2)
Socio-economic factors	3(2)
Personality traits	3(2)
Demographics	2(1)
Parental factors	2(2)
Peer factors	2(1)

3.9.6 Quality of included reviews

Five of the seven reviews were suitable for critical appraisal⁵. Reviews were classified as either medium quality (n=3) or low quality (n=2). None of the reviews were classified as high quality. When exploring risk of bias within individual domains we found:

- **Low risk of bias** was identified in **one domain** as all reviews reported
 - o an explicit aim/research question and inclusion criteria (n=5)
- **Unclear/moderate risk of bias** was identified in **four domains** as not all reviews:
 - o made clear reference to an existing protocol (n=3),
 - o employed a fully comprehensive search strategy (n=4)
 - o included references when reporting their reasons for excluding studies (n=5)
 - o adequately reflected on the quality of the evidence base when interpreting the findings (n=4)
- **High risk of bias** was identified in the remaining **six domains** as reviews failed to:
 - o lack of a rationale for study design eligibility criteria (n=3)
 - o conduct duplicate screening (n=5)
 - o conduct duplicate data extraction (n=5)
 - o conduct any form of quality appraisal (n=7)

⁵ The two qualitative evidence synthesis of CYP's views was not critically appraised. See section 6.5. for further details.

- provide funding details of included studies (n=7)
- report conflicts of interests (n=3)

The single meta-analytic study was conducted appropriately. It explored quality ratings when interpreting the findings as well as other sources of heterogeneity. However, it did not examine publication bias. Quality assessment ratings for each review are shown in Appendix 3.8.

3.10 Smartphone use

3.10.1 Key findings

- **Number of reviews:** Two reviews on smartphone use were included.
- **Review aims:** Both reviews explored associations only. None explored longitudinal risk factors or consequences of smartphone use or CYP experience of using smartphones.
- **Population:** Neither reviews focused exclusively on CYP.
- **Volume of evidence:** The number of studies included in each review ranged from 20 to 40.
- **Type of synthesis:** Meta-analysis was performed in one review.
- **Outcome focus:** Reviews measured both mental health and psychosocial outcomes (e.g. depression, distress, anxiety).
- **Quality of reviews:** Both reviews were classified as medium quality.

3.10.2 Introduction

This section describes the two systematic reviews which assessed the relationship between smartphone and problematic smartphone use and mental health and psychosocial outcomes. Smartphone addiction involves the compulsive overuse of smart phones and is a type of technology addiction. It is viewed as different from problematic internet use because of its platform, interface, multitasking capability and multifunctionality (internet access and mobile phone) (Soukup 2015). There is currently a lack of diagnostic criteria or classification algorithms for problematic smartphone use (Lopez-Fernandez 2014).

3.10.3 Aims of included reviews

The two reviews examined the relationship of between smart phone addiction and mental health and psychosocial outcomes. Neither review explored the risk factors or consequences related to smartphone addiction and no qualitative syntheses on views data related to smartphone use were located.

3.10.4 Review characteristics

The two reviews were published in 2017 and 2018 respectively. Neither review focused on a particular geographical area. Although the reviews did not limit by population age, most of the included studies focused on college students and young adults but did not undertake any further targeting of populations. Both reviews applied broad study design inclusion criteria. One review searched literature from 2008 to 2015 and the other did not state the search dates. The reviews included 23 and 37 studies each. One review conducted a meta-analysis and one review conducted a summative synthesis.

The review characteristics are summarised below in Table 3.10.1 below. A table describing the characteristics of each review is available in Appendix 3.9.

Table 3.10.1 Summary of review characteristics for smartphone use

Characteristics of all smartphone use reviews (n=2)	
Geographical location	<ul style="list-style-type: none"> No limits (2)
Age	<ul style="list-style-type: none"> No limits (2)
Other participant characteristics	<ul style="list-style-type: none"> No restrictions (2)
Study design filter	<ul style="list-style-type: none"> No limits (2)
Search start date	<ul style="list-style-type: none"> Not stated (1) 2008 (1)
Number of included studies	<ul style="list-style-type: none"> 23 (1) 37 (1)
Types of synthesis	<ul style="list-style-type: none"> Summative synthesis (1) Meta-analysis (1)

3.10.5 Outcomes

Both reviews reported outcomes on the relationship between smartphone use and mental health and psychosocial wellbeing. We present the descriptive overview of the outcomes reported in the reviews by type of data examined: i.e. 'associations with smartphone use' (which can include reviews reporting cross-sectional associations or a mixture of cross-sectional associations and longitudinal data in a single synthesis for each outcome). See Table 3.10.2 for the type and frequency of outcomes examined.

Association with problematic smartphone use (n=2)

Both reviews looked at anxiety as a mental health outcome associated with smartphone use, with depression outcomes also reported in one review. For psychosocial outcomes, stress was reported in both reviews, and self-esteem reported in one review.

Table 3.10.2: Summary of outcome measures across smartphone reviews, by type of data

	Associations with smartphone use (n=2)
Mental health outcomes	
Depression	1
Anxiety	2
Psychosocial outcomes	
Self-esteem	1
Stress/distress	2

3.10.6 Quality of included reviews

Both reviews were critically appraised and were classified as medium quality. When exploring within individual domains we found:

- **Low risk of bias** was identified in **two domains** as both reviews
 - o reported an explicit aim/research question and inclusion criteria (n=2)
 - o reported reliable methods of duplicate data screening (n=2)
- **Unclear/moderate risk of bias** was identified in **six domains** as not all reviews:

- made clear reference to an existing protocol (n=1)
 - employed a fully comprehensive search strategy (n=1)
 - conduct duplicate data extraction (n=1)
 - included references when reporting their reasons for excluding studies (n=1)
 - adequately reflected on the quality of the evidence base when interpreting the findings (n=1)
 - report conflicts of interests (n=1)
- **High risk of bias** was identified in the remaining **three domains** as reviews failed to:
- lack of a rationale for study design eligibility criteria (n=2)
 - conduct any form of quality appraisal (n=2)
 - provide funding details of included studies (n=2)

One review employed meta-analysis appropriately, explored sources of heterogeneity and publication bias. Quality assessment ratings are shown in Appendix 3.9

4 Discussion

4.1 Summary of the evidence

We located 82 reviews investigating screen-based activities and their relationship with mental health and psychosocial outcomes. Our results reflect the recent growth of interest in this topic, with over three quarters of the reviews published in 2014 or later. The reviews synthesised evidence on a range of topics, from the broad construct of 'screen time-based sedentary behaviour' to different types of engagement involving screen use, such as gaming, social media sites and 'sexting'. A number of reviews also focused exclusively on the detrimental effects of cyberbullying. Although our primary focus was CYP aged 25 years or under, a small proportion of reviews covered a broader age range. Overall, there was greater emphasis on the CYP age group in the context of screen time, gaming, social media, cyberbullying, and sexting compared to general and problematic/addictive internet use. A wide spectrum of mental health and psychosocial outcomes has been investigated across the reviews. These included commonly recognised mental health outcomes such as depression and anxiety, in addition to outcomes such as self-esteem, loneliness, social connectedness and life satisfaction. Measures of self-harm, suicidal behaviours and substance misuse were also synthesised. Although the relationship between some outcomes and screen-based activities could appear more often in the literature (e.g. social media and anxiety, cyberbullying and suicide, gaming and ADHD) there was no clear pattern to suggest that certain outcomes were more likely to be measured with certain types of screen-based activities than others. Apart from the seven reviews examining the longitudinal consequences of screen time, there was a lack of longitudinal evidence synthesis on risk factors and consequences associated with screen-based activities such as internet use, cyberbullying, sexting, or smart phone use. Similarly, only one or two reviews explored risk factors or consequences of social media or problematic internet use, often focusing on depression, at the exclusion of other possible relevant outcomes.

The number of included studies varied considerably across reviews. This often reflected the breadth of the review's scope (e.g. when reviews did not apply age, study design or outcome eligibility criteria); and in some reviews the approach to searching (e.g. no date limits and searching widely using a range of terms), but often the reasons for variation were less clear. Overall, very few reviews employed meta-analysis, despite including primary studies with reasonable sample sizes, suggesting potential heterogeneity in the primary studies, or a lack of synthesis methods for addressing that heterogeneity (Melendez-Torres et al., 2015). The reviews on screen time and problematic/addictive internet use were mostly classified as either high or medium quality. However, key methodological weaknesses were identified across many of the reviews. For example, it was difficult to ascertain if steps had been taken to reduce bias via quality assurance processes for screening and extracting data because of a lack of reporting; and there was also a lack of critical appraisal of the evidence in over half of the reviews. The adoption of PRISMA guidelines in review reporting is recommended so that quality and reporting issues such as these can be disentangled.

4.2 Concepts and definitions of 'screen-based activities'

This systematic map adopted the umbrella term 'screen-based activities' to capture the breadth of review-level research activity on the use of electronic devices involving screens. The type of screen-based activity investigated, and how it was defined and 'framed', is central to the research process as it provides the lens through which research is conducted and how the findings are interpreted

and understood. Reviews synthesising evidence at the broadest level of screen-time considered the extent to which sedentary lifestyles may be linked with mental health and psychosocial outcomes (Carson et al., 2016, Costigan et al., 2013, Dennison et al., 2016, Poitras et al., 2017). They explicitly and implicitly draw on the 'displacement hypothesis' which suggests that time spent in front of screens may replace more energy expending, health promoting activities (Liu et al., 2016, Suchert et al., 2015). However, authors of reviews noted that the mechanisms underlying such an association has not always been underpinned by clear theoretical concepts in primary studies. This makes it difficult to extrapolate and identify the independent effect of sedentary behaviour from other lifestyle factors and whether one behaviour (e.g. sitting for long periods) does in fact displace another (physical activity), at the evidence synthesis level (Hoare et al., 2016).

Some reviews focused on internet use and social media also draw on theory concerning 'displacement'. However, their focus tends to be on the link between time spent online being displaced with face to face interaction and/or non-productive activities leading to detrimental effects on mental health and psychosocial outcomes, rather than being sedentary (Huang, 2010, Seabrook et al., 2016). The underlying assumption is that the quality of engagement and social interaction is likely to be less than optimal (e.g. aimless browsing, weaker social ties) leading to poorer mental health. Conversely some reviews also explored theoretical ideas which point to the role of the internet in augmenting CYP's social support and identity development by providing an additional route to learn new things (e.g. the internet as a knowledge resource, in addition to entertainment), for everyday social interaction (e.g. maintaining friendships via email, instant messaging, social networking sites) and self-expression (Prizant-Passal et al., 2016, Seabrook et al., 2016). The reviews on social media also considered how mental health and psychosocial effects may depend on the way CYP engage with different aspects of social networking sites, and certain features unique to social media use, such as the quality of interactions, the size of an individuals' friend network, active versus passive engagement, or fear or even joy of missing out (e.g. 'fomo' versus 'jomo').

This differs from theoretical explanations used to explore problematic internet use which draw extensively from the existing literature on addiction. For example, frequent, excessive and uncontrolled use of the internet or social media platforms that interrupts everyday life, the withdrawal symptoms that occur when not connected online and the possible circular impact of mental health effects (e.g. the increasing time spent online to achieve intended benefits, such as improved mood, in turn causing daily disruption leading to worsening mental health). The extent to which an addictions model is best placed to provide an explanatory framework continues to be debated in the field; as an agreed definition of what constitutes problematic internet use continues to be established (Kuss et al., 2013). For example, internet use disorder may encompass a number of different behaviours, such as addiction to shopping, dating, gaming or pornography, which could be present and manifest both on and/or offline. Similar conceptual issues have been raised in the gaming literature, also drawing attention to issue of heterogeneity, as games can be played both online as well offline, and can involve singular and multiple players, making it difficult to establish a clear hypothesis between engagement in games and mental health and psychosocial outcomes (Kuss and Griffiths, 2012). Review authors also note that this lack of shared definitions is reflected in the use of different tools to assess problematic internet or gaming use (Wang et al., 2017). Again, these issues draw attention to the need to explore not just the amount of time spent in front of screens but the ways in which CYP engage with different screen-based activities.

It should be noted, that this is not a systematic overview of the concepts and definitions used in reviews to frame their research. Rather, it is an acknowledgement that research in this field continues to explore different theoretical perspectives to shape investigations, which future evidence synthesis would benefit from engaging with in greater depth.

4.3 Strengths and limitations

This systematic map has sought to describe review-level research activity on a range of screen-based activities and their relationship to CYP's mental health and psychosocial outcomes. By conducting an extensive and comprehensive search that was not limited by type of screen-based activity or on a singular or pre-defined set of mental health and psychosocial outcomes we were able to explore the breadth of review literature undertaken in this field. Mapping reviews that included studies broader than our population age range of interest also meant that we did not miss reviews which conducted a separate analysis for CYP. Interestingly, many of the mental health and psychosocial outcomes measured in CYP were also investigated in older population groups, suggesting that interest in the effects of screen-based activities can extend into adulthood. The search was limited to the last ten years, to coincide with the advent of contemporary technologies (e.g. the introduction of the iPhone in 2007 and Android in 2008) and to reviews indexed in English-language databases and reported in the English language. Thus, despite identifying 82 reviews, further evidence syntheses may have been conducted in older reviews and other languages. The extent to which the systematic reviews, included the same primary studies (thus, double counting them) remains unknown, but it is likely there could be a high degree of crossover between studies within and across the topics.

To provide clear signposting and navigation of the reviews included in the map, we grouped them according to their key primary focus of interest, using the framework outline in Section 1.3 as our starting point. However, as the reviews have differing breadths of scope and different approaches to how they grouped studies in their own syntheses, it means that reporting overlaps in the scope of the reviews have been missed. For example, some of the reviews on screen time also include subsets of primary studies on gaming (sometimes reported in a separate synthesis), which are not accounted for in our section on gaming. The reviews on general and problematic/addictive internet use can also contain studies on social media; and the reviews of cyberbullying and sexting can also overlap. As stated above, it is also likely this overlap means reviews have included the same studies.

This systematic map provides a descriptive overview of review-level research activity, not a meta-synthesis of findings. However, unlike most maps, most included reviews were critically assessed for their methodological quality, enabling us to make judgments about the quality of the evidence base. Conducting a systematic map of reviews has provided a robust method for becoming familiar with a very broad review-level evidence base in a short time frame. However, when utilising meta-review methodology (i.e. exploring evidence at the review level rather than primary research itself) there is always a distance between the reviewers and the original studies. For example, although we have been able to provide frequencies of how many reviews report outcomes, we have not collected information about the size of the primary evidence base for each outcome. In addition, we have judged the quality of the reviews, but we do not know the quality of the primary studies within the reviews, which would require further in-depth review synthesis.

5 Conclusions

5.1 Gaps in the evidence

Despite considerable systematic review activity in this field there were some notable gaps in the literature. A key limitation identified among review authors was the tendency in primary studies to draw on cross-sectional data with a lack of prospective research designs, preventing them from providing a clear indication of nature of any causal relationship between screen-based activities and mental health outcomes. However, even in reviews where longitudinal data were identified, they were often not synthesised separately. Synthesised evidence on the factors potentially mediating and/or moderating the relationship between screen-based activities and mental health outcomes was also sparse, limiting our understanding of what influences CYP behaviour in this area. Even fewer reviews analysed subsets of populations (e.g. age groups, gender, mental health status) which could help contextualise the relationship between screen-based activities and mental health and psychosocial outcomes. Similarly, although some reviews included qualitative data, there is a lack of synthesis of critically appraised evidence about CYP's experiences of different types of screen-based activities. As such, there is a dearth of evidence about the contexts and causal mechanisms which might underpin any relationship between screen-based activities and the mental health and psychosocial wellbeing of CYP.

To address these gaps, there is a need to explore the temporal relationship between different types of screen-based activities and mental health and psychosocial outcomes by prioritising the identification and evidence synthesis of primary longitudinal data. Further examination of moderators and mechanisms of these associations is needed, in addition to qualitative evidence synthesis which explores CYP's own perspectives and experiences of screen-based technologies. Generating such evidence is necessary to improve our understanding how and why the use of screen-based activities may impact mental health and psychosocial outcomes. This understanding could be supported by prospective designs which explore whether a cause precedes an effect (i.e. for there to be evidence of a change in mental health *after* engagement in screen-based activities) and by generating hypotheses about the possible mental health effects of screen-based activities, from a qualitative evidence synthesis of CYP's views. Taking this approach could help to unpack assumptions about those impacts and underlying mechanisms, as part of a wider causal-chain framework.

In addition, further evidence synthesis in any one or more of these areas, may also benefit from being guided by a causal-chain framework that is theoretically informed, to explicate the antecedents and/or mediators or moderators of effects. Such a framework could be developed 'a priori' from the current review-level evidence base identified and tested with new primary longitudinal research literature. This framework could also support conceptual engagement with the considerable heterogeneity in primary studies identified from the reviews, in the absence of agreed definitions of screen-based activities and the range of possible mental health and psychosocial outcomes possible.

5.2 Research implications

To date, the short and longer-term consequences of screen time on the mental health and psychosocial wellbeing of CYP has been synthesised in high quality reviews, and a recent meta-

review (Stiglic and Viner 2019). However, research which takes a more nuanced and temporal view of the mental health effects of specific subsets of screen-based activities is required in addition to evidence which can provide a contextualised explanatory account of the mechanisms of impact being observed.

Thus, future evidence synthesis in this area are needed to explore:

The dose-response relationship by examining the;

- prospective association between frequency and/or intensity of screen-based activity measured at a broad level (e.g. social media, gaming, internet use) and mental health and psychosocial outcomes.

Mechanisms of impact by examining the;

- prospective association between different types of screen-based activities and other factors related to screen-based activity (e.g. scrolling websites, instant messaging, posting selfies, type/timing of gaming, blogging,) and different mental health and psychosocial outcomes.
- impact of different screen-based activities on mental health and psychosocial outcomes moderated by contextual factors (e.g. peer group, school environment, parenting) and subsets of CYP populations (e.g. age, gender, mental health status).
- experience of screen-based activities, drawing on CYP's views about how it affects their mental health and psychosocial wellbeing.

Overall the potential for new evidence synthesis outlined above hinges on the availability of longitudinal primary research that explores whether there is a dose-response relationship between screen-based activities and mental health, whether screen-based activities act as either an antecedent and/or consequence of mental health and psychosocial wellbeing, and whether these temporal relationships are moderated by contextual factors or are similar or different across different CYP population groups.

Although there is also a lack of evidence synthesis on the prospective association between cyberbullying and mental health and psychosocial outcomes, further in-depth exploration of existing high-quality reviews on cyberbullying may be sufficient to ascertain the extent to which cyberbullying poses a threat to the wellbeing of CYP. A meta-synthesis of these reviews could also be used to inform future primary research on designing prevention programmes, for example by exploring the risk factors that lead to cyberbullying victimisation and perpetration.

The greater availability of this type of knowledge is vital to support policymakers, parents, CYP and the wider community make informed choices about their mental health and how they engage with screen-based activities.

6 Detailed methods

6.1 Policy stakeholder engagement

The Department of Health and Social Care Mental Health policy team was consulted to understand the context of the issue under study, and collaborated on the development of the research question(s) and focus of the review. Regular meetings were held between the EPPI-Centre and the Chief Medical Officer and DHSC policy analysts to ensure the review remained closely aligned with their needs and emerging policy requirements. The meetings enabled us to: discuss the overall scope and direction of the review as the policy context evolved in this area, stay abreast of complementary research being undertaken by other UK academics and related policy initiatives to avoid duplication of effort, and provided us with an opportunity to present emerging findings and shape the final report outputs.

6.2 Search strategy

Searches of 12 bibliographic databases that contain research literature on mental health, healthcare, social science and education were carried out between 20-23 August 2018. The following bibliographic databases were searched: ASSIA (Proquest), CINAHL PLUS (EBSCO), ERIC (EBSCO), EMBASE (OVID), Emerging Sources Citation Index (Web of Science), IBSS (Proquest), MEDLINE (OVID), PsycINFO (OVID), Scopus, Social Policy and Practice (OVID), Sociological Abstracts (Proquest), Social Science Citation Index (Web of Science). We also searched six other online resources: BASE, Epistemonikas, Google, Google Scholar, Schools Health Education Unit website, UK Safer Internet Centre website. Systematic reviews were also identified from title and abstract screening of a concurrent review undertaken at the EPPI-Centre.

The search strategy was developed and implemented by an information specialist (CS) in collaboration with the lead reviewer (KD). The search comprised of four concepts that needed to be present in each of the study citations: 1) children, young people or young adults; 2) cyberbullying, social media, online social interaction, online gaming, internet use or screen-time; 3) mental health, wellbeing, risk-taking behavior or emotional outcomes, or cyberbullying; 4) systematic reviews. Where possible, the database searches were limited to citations published since 2007 in the English language.

Synonyms and alternative words for each of these concepts were used to search titles, abstracts, keywords and controlled vocabulary fields of the databases in order to try to capture a wide range of systematic reviews. Journal fields were searched for the population concept. The search was developed in Psycinfo and translated into other databases as appropriate. The search history for Psycinfo is presented in Appendix 1.

6.3 Including studies in the systematic evidence map

We included systematic reviews investigating the relationship between screen-based activities and mental health and psychosocial outcomes, published in English within the last ten years. Table 6.1.1 outlines our eligibility criteria in further detail.

Table 6.1.1 Eligibility criteria

Criterion	To be included in the map a review must:	Rationale/Definitions
1. Language	Be published in English	As there is a lack of capacity in the team to search for and examine reviews in all languages, and resources/time to get literature translated by others we could only include those available in the English language.
2. Date	Be published in or after 2007	We included reviews from 2007 onwards, as this is when the use of 'real time' mobile communication became more prevalent, in the advent of new Wi-Fi enabled mobile phone technology (Campbell 2008).
3. Topic	Investigate the relationship between screen-based activities and mental health and psychosocial outcomes	<p>We included reviews interested in synthesising evidence on: views on the mental health or psychosocial impacts of screen-based activities or quantitative measures of mental health and/or psychosocial outcomes prior to or following screen-based activities.</p> <p>We included reviews interested in any mental health and psychosocial outcomes (e.g. depression, anxiety, self-esteem, loneliness, life satisfaction, social connectedness, social support).</p> <p>We used the following definitions to guide the review:</p> <p>Screen time: engagement in electronic screens of any type</p> <p>Internet use: engagement in activities that require an online internet connection (e.g. email, websites, file sharing)</p> <p>Gaming: the use of video games, including multi-player games accessed via the internet</p> <p>Social media: the use of internet-based platforms, accessed via mobile phone, mobile applications or web sites, on which individuals can connect with other users to generate content and/or maintain social connections (Ellison and Boyd 2013).</p> <p>Cyberbullying: any form of bullying taking place online via any device</p>
4. Population	Include studies with CYP under 25	We excluded reviews where the majority of studies focused on adults over 25 years of age or where there was insufficient detail to make this judgement.
5. Study Design	Be a systematic review	Reviews needed to have searched two electronic databases and report their eligibility criteria for study inclusion.

6.4 Data extraction

The coding tool was developed by exploring previous tools used in systematic maps and meta-reviews, and generated inductively by sampling three to four reviews, to consider if there was sufficient level of reporting detail to be useful. The latter approach was also taken when developing categories for outcomes. We were interested in capturing the overall focus and aims of the review as reported by the review authors (e.g. the relationship between screen time, social media, cyberbullying, smartphone use and mental health and/or psychosocial outcomes), the review scope

based on the eligibility criteria they applied, the extent of the literature they searched for and identified, and the type of outcomes they reported. We were also interested in reporting if reviews had identified and synthesised longitudinal data, as this appeared to be a noticeable gap in our initial scoping exercise of reviews on social media. Table 6.4.1 provides an example of the type of data extracted from all reviews. The full coding tool is available in Appendix 2.2

Table 6.4.1 Coding tool

Domains		Criteria/Guidance: Code	Codes e.g.:
Review focus and aims	Publication year	The year the review was published	- 2010, 2011, 2012 etc.
	Focus	Screen-based activity focus of reviews	- Screen time; Internet Use; - Social Media; Etc.
	Aims of included reviews	Key aims of the review	- Associations between screen-based activity and MH outcomes; - Longitudinal associations (e.g. risk factors and consequences of screen-based activities - CYP's view/experiences
Review Scope*	Geographical location	Any geographical limits placed on inclusion of studies	- High income countries only; - No geographical limits placed
	Population: age	Age range reviews focused on	- CYP aged 0-25 only - No age limits placed
	Population: other targeting	Any focus on other CYP population characteristics of interest	- CYP with mental health issues - No population targeting
	Study design	Study design inclusion criteria	- Longitudinal studies only - Quantitative studies etc.
	Date range searched	The date range of search reported in methods	- Provide year to year as stated in the reviews - Not reported
	Number of included papers	The number of papers that passed inclusion screening	- N=papers included - Not reported
	Type of synthesis	Approach taken to combine and analyse the data	- Summative synthesis**; - Meta-analysis - Qualitative evidence synthesis
Outcomes and factors	Associations between screen-based activities and outcomes	Code outcomes and factors based on the aim of the review question being investigated	- Mental health outcomes: (e.g. depression, anxiety, self-esteem)
	Longitudinal risk factors of screen-based activities		- Psychosocial outcomes (e.g. life satisfaction, social connectedness)
	Longitudinal consequences of screen-based activities		- Factors (e.g. personality traits, demographics)

* Based on the review eligibility criteria, not the description of included primary studies

** where summary statements made about the quantity of evidence, such as 'two studies found an association between screen time and anxiety, but which do not conduct meta-analysis

Outcomes were coded taking into consideration how they were organised and synthesised in reviews. For example, some reviews sought to explore the associations (relationships) between screen-based activities and outcomes, these reviews often combined studies of singular or more than one study design to address their aim (e.g. cross-sectional or longitudinal survey data, content analysis, and/or qualitative studies). Other reviews also examining the risk factors (precursors) or consequences of screen-based activities drew on longitudinal data only. As stated above it was

deemed important to capture which reviews had synthesised studies whereby screen-based activity use (independent variable) has been measured prior to, and with a time lapse, between mental health and psychosocial outcomes (dependent variable). The outcomes coding tools were also generated for each topic focus and broken down for each type of data collected (see Appendix 2.2). This enabled easier frequency collating for each topic and reduced error in reporting.

6.5 Quality appraisal

Systematic maps seek to describe the nature and extent of primary or review evidence and do not attempt to extract and synthesise the findings from that evidence. Thus, it is rare to find a critical appraisal of the evidence as the need to provide an indication of the trustworthiness of the findings is typically not required. However, in this systematic map there was a policy directive to identify not only if there was sufficient quantity but quality to conduct a meta-review in any given topic before considering the need to embark on a new systematic review. This was particularly salient for reviews which sought to synthesise quantitative data on the association between screen-based activities and mental health and psychosocial outcomes as this was of primary interest to policy. We therefore decided to assess the methodological quality of included reviews of largely quantitative studies by adapting the AMSTAR 2 criteria (Shea et al., 2017). Qualitative evidence synthesis of children and young people's views synthesised was also of interest to policy. However, we did not appraise the reviews of qualitative views because of the lack of a validated/agreed tool for judging the quality of this type of review.

As stated, the AMSTAR 2 was modified slightly to accommodate our focus on surveys. Specifically, research question one was refined to prompt reviewers to consider if reviews had defined their population and outcomes of interest, but not intervention and controls, as they would not be applicable. We also focused on measures (independent and dependent variables) assessed in the surveys for the outcomes portion of the question. Similarly, for question 8 on the description of studies included in the reviews, that also specified a response in terms of interventions, modifications were made to prompt reviewers to refer to the measures used in surveys. For example, reviewers identified if an adequate description of the measures (e.g. the independent and dependent variables) were specified in the reviews, rather than descriptions of interventions and comparators.

Question seven, on the provision of excluded studies, was also modified to facilitate accuracy in coding. Specifically, to achieve a low risk of bias, authors needed to have provided a list of all potentially excluded studies; and for a 'partial yes' response, reports of numbers of excludes with reasons (e.g., presented in a PRISMA diagram) were accepted. The failure to report either of these qualified as a 'no' response. A partial yes was also added to question 13, on whether the authors accounted for risk of bias in individual studies when interpreting/discussing the results of the review. The partial yes was used to assess when the review author provided discussion of the likely impact of possible bias (e.g., in terms of study design used) in the discussion section. A 'yes' response was reserved for studies that conducted a formal risk of bias and discussed the review's findings in relation to these.

We classified the overall quality of reviews by weighting them as high, medium and low quality. We used the following framework. To be classified as:

High quality reviews needed to answer yes or partial yes in all of the following:

- **Review question and inclusion criteria:** did the reviews report an explicit aim/research question and inclusion criteria:
- **Search strategy:** Did the review authors use a comprehensive literature search strategy?
- **Duplicate screening:** Did the review authors perform study selection in duplicate?
- **Excludes reported:** Did the review authors provide a list of excluded studies and justify the exclusions?
- **Description of studies** Did the review authors describe the included studies in adequate detail?
- **Quality appraisal:** Did the review authors quality appraise the included studies?

Medium quality reviews needed to meet yes or partial yes on a combination of the following:

- **Review question and inclusion criteria:** there an explicit aim/research question and inclusion criteria?
- **Search strategy:** Did the review authors use a comprehensive literature search strategy?
- **Duplicate screening:** Did the review authors perform study selection in duplicate? *OR*
- **Excludes reported:** Did the review authors provide a list of excluded studies and justify the exclusions?
- **Description of studies** Did the review authors describe the included studies in adequate detail?

Low-quality reviews failed to meet at least one of these criteria.

6.6 Data management and quality assurance

Search results were imported into the systematic review software, EPPI-Reviewer 4 (Thomas et al. 2010). We also piloted the eligibility criteria and coding tool by comparing decisions in groups of two reviewers using systematic review software, EPPI-Reviewer 4 (Thomas et al., 2010). Citations identified by our searches were initially screened on titles and abstracts. Full reports were obtained for those citations judged as meeting the eligibility criteria or where there was insufficient information from the title and abstract to assess relevance. At each stage of dealing with citations for the review (screening titles and abstracts, screening full reports and double-coding) an initial sample of citations was coded by reviewers independently and differences resolved by discussion. If agreement was adequate (e.g. between 80-90%) for this initial sample, the remaining citations were screened or coded by a single reviewer alone. Again, where differences arose, they were resolved by seeking guidance from a third review author.

7 References

Included reviews

Aboujaoude E, Savage MW, Starcevic V, Salame WO (2015) Cyberbullying: Review of an Old Problem Gone Viral. *Journal of Adolescent Health* 57(1): 10-8.

Abreu R L, and Kenny M C (2018) Cyberbullying and LGBTQ Youth: A Systematic Literature Review and Recommendations for Prevention and Intervention. *Journal of Child and Adolescent Trauma* 11: 81-97.

Allen KA, Ryan T, Gray DL, McInerney Dennis M, Waters L (2014) Social media use and social connectedness in adolescents: The positives and the potential pitfalls. *The Australian Educational and Developmental Psychologist* 31(1): 18-31.

Anastassiou A (2017) Sexting and Young People: A Review of the Qualitative Literature. *The Qualitative Report* 22 8:2231-2239.

Anderson EL, Steen EI, Stavropoulos V (2017) Internet use and problematic internet use: A systematic review of longitudinal research trends in adolescence and emergent adulthood. *International Journal of Adolescence and Youth* 22(4): 430-454.

Baker DA, Algorta GP (2016) The Relationship Between Online Social Networking and Depression: A Systematic Review of Quantitative Studies. *Cyberpsychology, and behavior and social networking* 19(11): 638-648.

Baldry AC, Farrington DP, Sorrentino A (2015) "Am I at risk of cyberbullying"? A narrative review and conceptual framework for research on risk of cyberbullying and cybervictimization: The risk and needs assessment approach. *Aggression and Violent Behavior* 23: 36-51.

Barrense-Dias Y, Berchtold A, Suris JC, Akre C (2017) Sexting and the definition issue. *Journal of Adolescent Health* 61 (5): 544-554 2017.

Best P, Manktelow R, Taylor B (2014) Online communication, social media and adolescent wellbeing: A systematic narrative review. *Children and Youth Services Review* 41: 27-36.

Bottino S M, Bottino C M, Regina C G, Correia AV, and Ribeiro WS (2015) Cyberbullying and adolescent mental health: systematic review. *Cadernos de Saude Publica* 31, 463-475

Boyle EA, Connolly TM, Hainey T, Boyle JM (2012) Engagement in digital entertainment games: A systematic review. *Computers in Human Behavior* 28: 771-780.

Carli V, Durkee T, Wasserman D, Hadlaczky G, Despalins R, Kramarz E, Wasserman C, Sarchiapone M, Hoven C, Brunner R, Kaess M (2012) The association between pathological Internet use and comorbid psychopathology: A systematic review. *Psychopathology* 46: 1-13.

Carson V, Hunter S, Kuzik N, Gray CE, Poitras VJ, Chaput JP, Saunders TJ, Katzmarzyk PT, Okely AD, Gorber SC, Kho ME, Sampson M, Lee H, Tremblay MS (2016) Systematic review of sedentary behaviour and health indicators in school-aged children and youth: an update. *Applied physiology, nutrition, and metabolism* 41: S240–S265.

Che-Liang, Ho SS, Lwin-May O (2017) A meta-analysis of factors predicting cyberbullying perpetration and victimization: From the social cognitive and media effects approach. *New Media & Society* 19(8): 1194-1213.

Christofferson JP (2016) How is Social Networking Sites Effecting Teen's Social and Emotional Development: A Systemic Review. St. Catherine University: Master of Social Work Clinical Research Papers. Paper 650.

Clifton A, Goodall D, Ban S, Birks E (2013) New perspectives on the contribution of digital technology and social media use to improve the mental wellbeing of children and young people: A state-of-the-art review. *Neonatal, and Paediatric and Child Health Nursing* 16: 19-26.

Cooper K, Quayle E, Jonsson L, Svedin CG (2016) Adolescents and self-taken sexual images: A review of the literature. *Computers in Human Behavior* 55: 706-716.

Costigan SA, Barnett L, Plotnikoff RC, Lubans DR (2013) The health indicators associated with screen-based sedentary behavior among adolescent girls: A systematic review. *Journal of Adolescent Health* 52: 382-392.

Curtis BL, Lookatch SJ, Ramo DE, McKay JR, Feinn RS, Kranzler HR (2018) Meta-Analysis of the Association of Alcohol-Related Social Media Use with Alcohol Consumption and Alcohol-Related Problems in Adolescents and Young Adults. *Alcoholism: Clinical & Experimental Research* 42: 978-986.

Daine K, Hawton K, Singaravelu V, Stewart A, Simkin S, Montgomery P (2013) The power of the web: A systematic review of studies of the influence of the internet on self-harm and suicide in young people. *PLoS one* 8(10): e77555.

Dennison M, Sisson SB, and Morris A (2016) Obesogenic behaviours and depressive symptoms in children: a narrative literature review. *Obesity Reviews* 17: 735-757.

Dobrea A, and Păsăreanu CR (2016) Impact of social media on social anxiety: A systematic review: New Developments in Anxiety Disorders. Ed. F Durban and B Marchesi. Intech, <https://www.intechopen.com/books/newdevelopments-in-anxiety-disorders> >. Accessed August 2018.

Dyson MP, Hartling L, Shulhan J, Chisholm A, Milne A, Sundar P, Scott SD, Newton AS (2016) A Systematic Review of Social Media Use to Discuss and View Deliberate Self-Harm Acts. *PLoS ONE* 11(5): e0155813

Elhai JD, Dvorak RD, Levine JC, Hall BJ (2017) Problematic smartphone use: A conceptual overview and systematic review of relations with anxiety and depression psychopathology. *Journal of affective disorders* 207: 251-259.

Erfani SS, Abedin B (2018) Impacts of the use of social network sites on users' psychological well-being: A systematic review. *Journal of the Association for Information Science and Technology* 69: 900-912.

Ferguson CJ (2015) Do angry birds make for angry children? A meta-analysis of video game influences on children's and adolescents' aggression, mental health, prosocial behavior, and academic performance. *Perspectives on Psychological Science* 10: 646-666.

Fisher BW, Gardella JH, Teurbe-Tolon AR (2016) Peer cybervictimization among adolescents and the associated internalizing and externalizing problems: A meta-analysis. *Journal of Youth and Adolescence* 45: 1727-1743.

Foody M, Samara M, O'Higgins NJ (2017) Bullying and cyberbullying studies in the school-aged population on the island of Ireland: A meta-analysis. *British Journal of Educational Psychology* 87: 535-557.

Frost RL, Rickwood DJ (2017) A systematic review of the mental health outcomes associated with Facebook use. *Computers in Human Behavior* 76: 576-600.

Fumero A, Marrero RJ, Voltés D, Peñate W (2018) Personal and social factors involved in internet addiction among adolescents: A meta-analysis. *Computers in Human Behavior* 86: 387-400

- Gini G, and Espelage DL (2014) Peer victimization, cyberbullying, and suicide risk in children and adolescents. *JAMA: Journal of the American Medical Association* 312: 545-546.
- Gini G, Card NA, and Pozzoli T (2018) A meta-analysis of the differential relations of traditional and cyber-victimization with internalizing problems. *Aggressive Behavior* 44:185-198.
- Guo SY (2016) A meta-analysis of the predictors of cyberbullying perpetration and victimization. *Psychology in the Schools* 53: 432-453.
- Hamm MP, Newton AS, Chisholm A, Shulhan J, Milne A, Sundar P, Ennis H, Scott SD, Hartling L (2015) Prevalence and Effect of Cyberbullying on Children and Young People: A Scoping Review of Social Media Studies. *JAMA Pediatrics* 169(8): 770-7.
- Heerde JA, and Hemphill SA (2018) Are bullying perpetration and victimization associated with adolescent deliberate self-harm? A meta-analysis. *Archives of Suicide Research* 1-42.
- Ho RC, Zhang MW, Tsang TY, Toh AH, Pan F, Lu Y, Cheng C, Yip PS, Lam LT, Lai CM, Watanabe H, Mak KK (2014) The association between Internet addiction and psychiatric co-morbidity: A meta-analysis. *BMC Psychiatry* 14(1): 183.
- Hoare E, Milton K, Foster C, and Allender S (2016) The associations between sedentary behaviour and mental health among adolescents: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity* 13(1), 108.
- Holland G, Tiggemann M (2016) A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes. *Body Image* 17:100-10.
- Huang C (2010) Internet use and psychological well-being: a meta-analysis. *Cyberpsychology, and behavior and social networking* 13: 241-249.
- John A, Glendenning AC, Marchant A, Montgomery P, Stewart A, Wood S, Lloyd K, Hawton K (2018) Self-Harm, Suicidal Behaviours, and Cyberbullying in Children and Young People: Systematic Review. *Journal of Medical Internet Research* 20: e129.
- Kayis AR, Satici SA, Yilmaz MF, Simsek D, Ceyhan E, Bakioglu F (2016) Big five-personality trait and internet addiction: A meta-analytic review. *Computers in Human Behavior* 63:35-40.
- Klettke B, Hallford D J, Mellor DJ (2014) Sexting prevalence and correlates: a systematic literature review. *Clinical Psychology Review* 34: 44-53.
- Klomek AB, Sourander A, Gould M (2010) The association of suicide and bullying in childhood to young adulthood: A review of cross-sectional and longitudinal research findings. *The Canadian Journal of Psychiatry* 55(5): 282-288.
- Koo HJ, Kwon JH (2014) Risk and protective factors of internet addiction: a meta-analysis of empirical studies in Korea. *Yonsei Medical Journal* 55: 1691-1711.
- Kowalski RM, Giumetti GW, Schroeder AN, and Lattanner MR (2014) Bullying in the digital age: A critical review and meta-analysis of cyberbullying research among youth. *Psychological Bulletin* 140: 1073-1137.
- Kuss DJ, and Griffiths MD (2012) Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addictions* 1: 3-22.
- Kuss DJ, Griffiths MD (2012) Internet Gaming Addiction: A Systematic Review of Empirical Research. *International Journal of Mental Health and Addiction* 10: 278-296.
- Lam LT (2014) Risk factors of Internet addiction and the health effect of internet addiction on adolescents: a systematic review of longitudinal and prospective studies. *Current Psychiatry Reports* 16(11): 508-517.

- Le Blanc AG, Spence JC, Carson V, Gorber SC, Dillman C, Janssen I, Kho ME, Stearns JA, Timmons BW, Tremblay MS (2012) Systematic review of sedentary behaviour and health indicators in the early years (aged 0-4 years). *Applied physiology, nutrition, and metabolism* 37: 753–772.
- Lee JM, Hong JS, Yoon J, Peguero AA, Seok HJ (2018) Correlates of adolescent cyberbullying in South Korea in multiple contexts: A review of the literature and implications for research and school practice. *Deviant Behavior* 39: 293-308.
- Liu M, Wu L, Yao S (2016) Dose-response association of screen time-based sedentary behaviour in children and adolescents and depression: a meta-analysis of observational studies. *British Journal of Sports Medicine* 50: 1252-1258.
- Mahapatra A, Sharma P (2018) Association of Internet addiction and alexithymia – A scoping review. *Addictive Behaviors* 81: 175-182.
- Marchant A, Hawton K, Stewart A, Montgomery P, Singaravelu V, Lloyd K, Purdy N, Daine K, John A (2017) A systematic review of the relationship between internet use, self-harm and suicidal behaviour in young people: The good, the bad and the unknown. *PLoS ONE* 12(8): e0181722.
- Marino C, Gini G, Vieno A, Spada MM (2018) The associations between problematic Facebook use, psychological distress and well-being among adolescents and young adults: A systematic review and meta-analysis. *Journal of Affective Disorders* 226: 274-281.
- Marino C, Gini G, Vieno A, Spada MM (2018) A comprehensive meta-analysis on Problematic Facebook Use. *Computers in Human Behavior* 83: 262-277.
- McCrae (2017) Social Media and Depressive Symptoms in Childhood and Adolescence: A Systematic Review *Adolescent Research Review* 2(4): 315-330..
- Mihara S, Higuchi S (2017) Cross-sectional and longitudinal epidemiological studies of internet gaming disorder: A systematic review of the literature. *Psychiatry and Clinical Neurosciences* 71(7): 425-444.
- Minges KE, Owen N, Salmon J, Chao A, Dunstan DW, Whittemore R (2015) Reducing youth screen time: Qualitative metasynthesis of findings on barriers and facilitators. *Health Psychology* 34: 381-397.
- Mitrofan O, Paul M, Spencer N (2009) Is aggression in children with behavioural and emotional difficulties associated with television viewing and video game playing? A systematic review. *Child: Care, and Health & Development* 35: 5-15.
- Nolan S, Hendricks J, Ferguson S, Towell A (2017) Social networking site (SNS) use by adolescent mothers: Can social support and social capital be enhanced by online social networks? - A structured review of the literature. *Midwifery* 48: 24-31.
- Mubarak S, Mubarak AR (2015) Online self-disclosure and wellbeing of adolescents: A systematic literature review *arXiv preprint arXiv* 1606.03527.
- Paulus FW, Ohmann S, von Gontard A, Popow C (2018) Internet gaming disorder in children and adolescents: A systematic review. *Developmental Medicine & Child Neurology* 60: 645-659.
- Poitras VJ, Gray CE, Janssen X, Aubert S, Carson V, Faulkner G, Goldfield GS, Reilly JJ, Sampson M, Tremblay MS (2017) Systematic review of the relationships between sedentary behaviour and health indicators in the early years (0-4 years). *BMC Public Health* 17: 868.
- Prizant-Passal S, Shechner T, Aderka IM (2016) Social anxiety and internet use-A meta-analysis: What do we know? What are we missing?. *Computers in Human Behavior* 62: 221-229.

- Rice E S, Haynes E, Royce P, and Thompson S C (2016) Social media and digital technology use among Indigenous young people in Australia: a literature review. *International Journal for Equity in Health* 15: 81.
- Rodgers RF, Melioli T (2016) The relationship between body image concerns, eating disorders and internet use, part I: A review of empirical support. *Adolescent Research Review* 1(2): 95-119.
- Schneider LA, King DL, Delfabbro PH (2017) Family factors in adolescent problematic Internet gaming: A systematic review. *Journal of Behavioral Addictions* 6: 321-333.
- Scott J, Porter-Armstrong AP (2013) Impact of Multiplayer Online Role-Playing Games upon the Psychosocial Well-Being of Adolescents and Young Adults: Reviewing the Evidence. *Psychiatry* 464685.
- Seabrook EM, Kern ML, Rickard NS (2016) Social Networking Sites, Depression, and Anxiety: A Systematic Review. *JMIR Mental Health* 3(4): e50.
- Smith LW, Liu B, Degenhardt L, Richters J, Patton G, Wand H, Cross D, Hocking JS, Skinner SR, Cooper S, Lumby C, Kaldor JM, Guy R (2016) Is sexual content in new media linked to sexual risk behaviour in young people? A systematic review and meta-analysis. *Sexual Health* 13: 501-515.
- Snilstveit B, Vojtkova M, Bhavsar A and Gaarder M. (2013). Evidence Gap Maps — A Tool for Promoting Evidence-Informed Policy and Prioritizing Future Research. *Policy Research Working Papers* 6725:1-32.
- Stiglic N, Viner RM (2019) Effects of screentime on the health and well-being of children and adolescents: a systematic review of reviews. *BMJ Open* 9: e023191.
- Suchert V, Hanewinkel R, Isensee B (2015) Sedentary behavior and indicators of mental health in school-aged children and adolescents: A systematic review. *Preventive Medicine* 76: 48-57.
- Sutcliffe K, Oliver S Richardson M. (2017). Describing and analysing studies, In Gough D, Oliver S and Thomas J. An introduction to systematic reviews, (2nd ed.) London: Sage Publishing
- Tokunaga RS (2010) Following you home from school: A critical review and synthesis of research on cyberbullying victimization. *Computers in Human Behavior* 26: 277-287.
- Tokunaga Robert S (2017) A meta-analysis of the relationships between psychosocial problems and Internet habits: Synthesizing Internet addiction, problematic Internet use, and deficient self-regulation research. *Communication Monographs* 84: 423-446.
- Tremblay MS, LeBlanc AG, Kho ME, Saunders TJ, Larouche R, Colley RC, Goldfield G, Gorber SC (2011) Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *International journal of behavioral nutrition and physical activity* 8(1): 98.
- Twomey C, O'Reilly G (2017) Associations of Self-Presentation on Facebook with Mental Health and Personality Variables: A Systematic Review. *Cyberpsychology, and behavior and social networking* 20(10): 587-595.
- Vahedi Z, Saiphoo A (2018) The association between smartphone use, stress, and anxiety: A meta-analytic review. *Stress and Health* 34: 347-358.
- Van Geel M, Vedder P, Tanilon J (2014) Relationship Between Peer Victimization, Cyberbullying, and Suicide in Children and Adolescents A Meta-analysis. *Jama Pediatrics* 168: 435-442.
- Van Ouytsel J, Walrave M, Ponnet K, Heirman W (2015) The association between adolescent sexting, psychosocial difficulties, and risk behavior: Integrative review. *The Journal of School Nursing* 31:54-69.

Wang B, Yao N, Zhou X, Liu J, Lv Z (2017) The association between attention deficit/hyperactivity disorder and Internet addiction: A systematic review and meta-analysis. *BMC Psychiatry* 7(1): 260.

Wilkinson Y, Whitfield C, Hannigan S, Ali PA, Hayter M (2016) A qualitative meta-synthesis of young peoples' experiences of 'sexting'. *British Journal of School Nursing* 11: 183-191

Wu YJ, Outley C, Matarrita-Cascante D, Murphrey TP (2016) A systematic review of recent research on adolescent social connectedness and mental health with internet technology use. *Adolescent Research* 1(2): 153-162.

Yuchang J, Junyi L, Junxiu A, Jing W, Mingcheng H (2017) The Differential Victimization Associated With Depression and Anxiety in Cross-Cultural Perspective: A Meta-Analysis. *Trauma Violence & Abuse* 1524838017726426

Other references

American Association of Council OC (2016) Media use in school-aged children and adolescents. *Pediatrics*, 138.

Best P, Manktelow R, Taylor B (2014) Online communication, social media and adolescent wellbeing: A systematic narrative review. *Children and Youth Services Review*, 41, 27-36.

Boyd D (2014) *It's complicated: The social lives of networked teens*, New Haven: Yale University Press.

Department of Digital, Culture, Media and Sport (2017) *UK Digital Strategy* [Online]. GOV.UK available at <https://www.gov.uk/government/publications/uk-digital-strategy>.

Dennison M, Sisson SB, Morris A (2016) Obesogenic behaviours and depressive symptoms in children: a narrative literature review. *Obesity Reviews*, 17: 735-757.

Dickson K, Richardson M, Burchett H, Kwan I, Stansfield C, Sutcliffe K, Kneale D, Thomas J (2018) *Social media and children and young people's mental health - unpublished protocol* London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education, University College London.

Dickson K, Vigurs C-A, Newman M (2013) *Youth work: a systematic map of the research literature*. Dublin: Department of Children and Youth Affairs.

Frith E (2017). *Social media and children's mental health: a review of the evidence*. London: Education Policy Institute.

Galpin A, Taylor G (2018) Changing behaviour: Children, adolescents and screen use. *The British Psychological Society*, www.bps.org.uk/news-and-policy/changing-behaviour-children-adolescents-and-screen-use.

Gough D, Oliver S, Thomas J (2017) An introduction to systematic reviews, In Gough D, Oliver S and Thomas J. *An introduction to systematic reviews*, (2nd ed.) London: Sage Publishing.

Griffiths M, Kuss D (2017) Adolescent social media addiction (revisited). *Education and Health*, 35: 49-52.

Holland G, Tiggemann M (2016) A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes. *Body Image*, 17: 100-10.

Huang C (2010) Internet use and psychological well-being: a meta-analysis. *Cyberpsychology, behavior and social networking*. 13: 241-249.

- Kardefelt-Winther D (2017). *How does the time children spend using digital technology impact their mental well-being, social relationships and physical activity? An evidence-focused literature review.* Innocenti Discussion Paper 2017-02. Florence, Italy: UNICEF Office of Research-Innocenti.
- Kuss DJ, Griffiths MD (2012) Internet Gaming Addiction: A Systematic Review of Empirical Research. *International Journal of Mental Health and Addiction*, 10, 278-296.
- Kuss DJ, Van Rooij AJ, Shorter GW, Griffiths MD, Van De Mheen D (2013) Internet addiction in adolescents: Prevalence and risk factors. *Computers in Human Behavior* 29: 1987-1996.
- Liu M, Wu L, Yao S (2016) Dose-response association of screen time-based sedentary behaviour in children and adolescents and depression: a meta-analysis of observational studies. *British Journal of Sports Medicine*, 50: 1252-1258.
- Livingstone S, Franklin K (2018) Families with young children and 'screen time'. *Journal of Health Visiting*, 6: 434-439.
- Livingstone S, Mascheroni G, Staksrud E (2018) European research on children's internet use: Assessing the past and anticipating the future. *New Media & Society*, 20: 1103-1122.
- Mascheroni G, Cuman A (2014) *Net Children Go Mobile: final report: deliverables D6. 4 and D5. 2*, Educat.
- McDool, E., Powell, P., Roberts, J. et al. (2016). *Social Media Use and Children's Wellbeing*. IZA Discussion Papers 10412, Institute for the Study of Labor (IZA).
- Melendez-Torres G, Bonell C, Thomas J (2015) Emergent approaches to the meta-analysis of multiple heterogeneous complex interventions. *BMC medical research methodology* 15: 47.
- Mullan K (2017) Technology and Children's Screen-Based Activities in the UK: The Story of the Millennium So Far. *Child Indicators Research* 1-20.
- Ngantcha M, Janssen E, Godeau E, Ehlinger V, Le-Nezet O, Beck F, Spilka S (2018) Revisiting Factors Associated With Screen Time Media Use: A Structural Study Among School-Aged Adolescents. *Journal of Physical Activity and Health* 15: 448-456.
- Ofcom (2016). *Children and parents: Media use and attitudes report*. London: Office of Communications London.
- Ofcom (2017). *Children and parents: Media use and attitudes report*. London: Office of Communications London.
- Poitras VJ, Gray CE, Janssen X, Aubert S, Carson V, Faulkner G, Goldfield GS, Reilly JJ, Sampson M, Tremblay MS (2017) Systematic review of the relationships between sedentary behaviour and health indicators in the early years (0-4 years). *BMC Public Health*, 17: 868.
- Prizant-Passal S, Shechner T, Aderka IM (2016) Social anxiety and internet use-A meta-analysis: What do we know? What are we missing? *Computers in Human Behavior* 62: 221-229.
- Przybylski AK, Weinstein N (2017) A large-scale test of the goldilocks hypothesis: quantifying the relations between digital-screen use and the mental well-being of adolescents. *Psychological science*, 28: 204-215.
- Salmela-Aro K, Upadaya K, Hakkarainen K, Lonka K, Alho K (2017) The dark side of internet use: two longitudinal studies of excessive internet use, depressive symptoms, school burnout and engagement among Finnish early and late adolescents. *Journal of youth and adolescence* 46: 343-357.

Sampasa-Kanyinga H, Lewis RF (2015) Frequent use of social networking sites is associated with poor psychological functioning among children and adolescents. *Cyberpsychology, Behavior, and Social Networking*, 18, 380-385.

Seabrook EM, Kern ML, Rickard NS (2016) Social Networking Sites, Depression, and Anxiety: A Systematic Review. *JMIR Mental Health*, 3: e50.

Shea BJ, Reeves BC, Wells G, Thuku M, Hamel C, Moran J, Moher D, Tugwell P, Welch V, Kristjansson E (2017) AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *British Medical Journal* 358: j4008.

Stokes G, Blanchard L, Dickson K, Burchett H, Brunton G, Richardson M, Jones-Diette J, Lorenc T, Khatwa M, Hinds K (2017) Research on Lyme disease in humans: A systematic evidence map. London: EPPI-Centre, Social Science Research Unit, UCL Institute of Education, University College London.

Suchert V, Hanewinkel R, Isensee B (2015) Sedentary behavior and indicators of mental health in school-aged children and adolescents: A systematic review. *Preventive Medicine*, 76: 48-57.

Thomas J, Brunton J, Graziosi S (2010) *EPPI-Reviewer 4.0: software for research synthesis*. EPPI-Centre Software 2010. London: Social Science Research Unit. Institute of Education, University of London.

Wang B-Q, Yao N-Q, Zhou X, Liu J, Lv Z-T (2017) The association between attention deficit/hyperactivity disorder and Internet addiction: A systematic review and meta-analysis. *BMC Psychiatry* 17(1): 260.

APPENDICES

Appendix 1: PRISMA checklist

Section/topic	#	Checklist item	Reported in Chapter #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	#1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	Abstract
BACKGROUND			
Rationale	3	Describe the rationale for the review in the context of what is already known.	#1
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	#1-2
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	Can provide on request
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	#2 & 5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	#2 & 5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Can provide on request
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	#2
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	#2 & 5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	#2 & 5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	#2 & 5
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	n/a

Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	N/A #3 for map findings
Section/topic	#	Checklist item	Reported in Chapter #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	#3
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	#3
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	#3 and Appendix 3
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	#3
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	N/A
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	#3
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	Executive summary #5
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	#4
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	#4
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	Supplied on request of submission

Appendix 2: Methods

Appendix 2.1 Example search strategy

PsycINFO search history

Database: PsycINFO (OVID) <1806 to August Week 2 2018>

Date of search: 21/8/2018

No of citations: 434

1 ("young people*" or child* or schoolchild* or boys or girls or adolescen* or youth* or "young person*" or teen*).ti,ab,id. (860310)

2 ((emerging or emergent or young or transition*) adj2 adult*).ti,ab. (48827)

3 (Young adj2 (men or "men's" or women* or female or females or male or males or user or users)).ti,ab. (22148)

4 (Millennial* or "college students" or undergraduate* or freshmen* or freshman* or Sophomore* or "generation Y").ti,ab. (168926)

5 (infant or infants or toddlers or toddler or "preschoolers" or "pre schoolers").ti,ab,id. (86347)

6 (Pediatric* or paediatric* or peadiatric* or child* or adolescen*).jx. (149927)

7 1 or 2 or 3 or 4 or 5 or 6 (1103633)

8 (cyberbull* or cybervictim* or (cyber* adj2 (bully* or victim* or harassment* or aggression or abuse))).ti,ab. (1843)

9 ((internet or online or web or website) adj2 (bully* or victim* or harassment* or aggression or abuse)).ti,ab. (514)

10 ("cyberbullying" or "cybervictim*").id. or cyberbullying/ (1420)

11 "internet addiction".ti,ab,id. (1600)

12 8 or 9 or 10 or 11 (3834)

13 online social networks/ or online community/ or computer mediated communication/ or internet addiction/ or blog/ or social media/ (17935)

14 computer games/ or screen time/ or internet usage/ or computer usage/ or electronic communication/ or cybersex/ or electronic communication/ or text messaging/ or internet/ (38511)

15 ((online or web or website* or internet) adj3 (game or games or gamer or gaming)).ti,ab. (2230)

16 (((chat* or social*) adj3 (game or games or gamer or gaming)) and (online or web or website* or internet)).ti,ab. (325)

17 (("computer game" or "computer gamer" or "computer gaming" or "console game" or "console gamer" or "console gaming" or "digital game" or "digital gamer" or "digital gaming" or "game console" or gaming or "gaming console" or "gaming system" or "social gaming" or "second life" or "virtual world" or "virtual worlds" or casino or "arcade game" or "arcade gaming" or videogame* or "video game*" or videogaming* or "video gaming*") adj10 (online or web or website* or internet or screen)).ti,ab. (1957)

18 ("e game" or "e games" or "e gaming" or "e gamer" or "electronic game*" or "electronic gaming").ti,ab. (343)

19 (((screen adj2 time) and (internet or online or web or website* or computer* or computing or game? or gaming or television or video* or digital or media or mobile or phone)) or ((screen adj2 activit*) and (internet or online or web or website* or computer* or computing or game? or gaming or television or video* or digital or media or mobile or phone))).ti,ab. (405)

20 ("screen time" or "computer use" or "electronic communication" or "screentime").ti,ab,id. (2899)

21 ("passive scrolling" or ((online or web or website* or internet) adj3 (browsing or browse))).ti,ab. (207)

22 ("digital media" or "digital communication" or "digital environment" or "online media" or "online communication" or "online environment" or "Internet media" or "internet communication" or "Internet environment").ti,ab,id. (4000)

23 (((social* adj2 network*) or (social* adj3 feature*) or (social* adj tool*) or (social* adj component*)) and (online or web or internet or website*).ti,ab. (5053)

24 ((Chat* or Communicat* or Interact* or networking or network or networks or connect* or social* or interpersonal or relationship* or participat* or "user generated" or "user controlled" or sharing or share* or comment* or messag* or post*) adj3 (online or web or internet or website*).ti,ab. (17556)

25 ((friend* or social*) adj5 (web or website* or site or sites or application* or online or internet)).ti,ab. (13743)

26 "social computing".ti,ab,id. (101)

27 ("social media" or facebook or linkedin or twitter or badoo or orkut or myspace or youtube or Instagram or snapchat or bebo or tumblr).ti,ab. (11507)

28 ((Internet or Online or website or web) adj2 forum*).ti,ab. (1336)

29 (Cyworld or Orkut or Renren or Vkontakte or Friendster or "see you too" or "CU2" or "friends reunited").ti,ab. (111)

30 ((Internet or online or Cyber*) adj5 world?).ti,ab. (1279)

31 (Chatrooms or chatroom or "chat room" or "chat rooms").ti,ab. (670)

32 (("social support" or "peer support" or "community support") adj5 (online or web or internet or website*).ti,ab. (522)

33 (blog* or "web log*" or weblog* or "web-based log" or vlog* or "videoblog*" or selfie* or "instant messaging").ti,ab,id. (3746)

34 ((using or usage or user? or "use") adj2 (online or internet or web*)).ti,ab. (14815)

35 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 (79899)

36 adolescent characteristics/ or child characteristics/ (4425)

37 well being/ or exp life satisfaction/ or exp mental health/ or exp "quality of life"/ or work-life balance/ (135060)

38 emotions/ or exp emotional states/ or negative emotions/ or positive emotions/ or emotional control/ (297195)

39 "depression (emotion)"/ or emotional states/ or exp major depression/ or exp sadness/ or exp separation reactions/ (176091)

40 anxiety disorders/ or exp anxiety/ or social anxiety/ (79630)

41 loneliness/ or emotional states/ (38211)

42 social isolation/ or stigma/ (17223)

43 suicide/ or self-destructive behavior/ or attempted suicide/ or self-injurious behavior/ or suicidal ideation/ (40098)

44 social identity/ or exp self-concept/ (78658)

45 (belonging or envy or confidence or connectedness or friendship* or relationship* or interpersonal* or "social support" or "social capital" or "support network" or "support networks" or loneliness or lonely or isolati* or "fear of missing out" or FOMO or rejection).ti,ab. (833873)

46 Social approval/ or social acceptance/ or social skills/ (20980)

47 friendship/ or interpersonal relationships/ or exp peer relations/ or relationship quality/ or exp relationship satisfaction/ or social support/ (80816)

48 ("Self-esteem" or "self concept*" or "self identify" or "self identification" or "self worth*" or "self perception*" or identity or "self efficacy" or (body adj3 (image or percept*))).ti,ab,id. (214617)

49 (mood or moods or emotions or happiness or happy or sadness or sad or angst or anxiety or anxieties or anxious* or worry or coping or copes or cope or fears or stoicism or resilience or satisfaction or dissatisfaction or dissatisfied or distress or distressed or depressi* or indifferenc* or helplessness or hopelessness* or trauma* or stress*).ti,ab,id. (883800)

50 ("Well-being" or "well being" or "wellbeing" or "quality of life" or "life quality" or suicid* or "self harm*" or "mental health" or "psychosocial" or "psycho social" or (balance* adj1 (life or lives or living))).ti,ab,id. (397470)

51 (risk or (risky adj3 (behav* or taking or take or takes or preferen* or percept* or perceiv* or judge* or manage*)) or harm* or addict* or binge drinking).ti,ab,id. (411912)

52 ((substance? or drug? or drinking or alcohol* or solvent?) adj1 ("use" or abus* or misuse*)).ti,ab,id. (123540)

53 ((substance? or drug? or drinking or alcohol* or solvent?) adj1 (usage or intake or using or taking or behavio* or user?)).ti,ab,id. (30972)

54 (drinking adj1 (alcohol* or binge)).ti,ab,id. (8960)

55 "Tobacco Smoking"/ or "Marijuana Usage"/ or "Drinking Behavior"/ or "Social Drinking"/ or "Binge Drinking"/ or "Underage Drinking"/ or "Alcohol Abuse"/ or "Alcohol Drinking Patterns"/ or "Alcohol Intoxication"/ or "Drug Usage"/ or "Inhalant Abuse"/ or "Drug Abuse"/ or risk taking/ (129339)

56 ((internet or online or gaming) adj2 disorder*).ti,ab. (656)

57 aggressive behavior/ or psychosocial factors/ (56200)

58 (inattention or hyperactivity or disordered or (behavi* adj2 problem*) or (behavi* adj2 condition*)).ti,ab. (88638)

59 12 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 (2133411)

60 (((("synthesis" or "systematic") and ("evidence" or "research" or "review")) or ("review" and (integrat* or critical* or "mapping" or "comprehensive" or "evidence" or "research" or "literature")))).ti. or ((systematic adj2 review*) or ("meta-analysis" or "Review articles" or "systematic review*" or "Overview of reviews" or "Review of Reviews") or ("data synthesis" or "evidence synthesis" or

"metasynthesis" or "meta-synthesis" or "narrative synthesis" or "qualitative synthesis" or "quantitative synthesis" or "realist synthesis" or "research synthesis" or "synthesis of evidence" or "thematic synthesis" or "systematic map*" or "metaanaly*" or "meta-analy*" or "systematic overview*" or "systematic review*" or "systematically review*" or "bibliographic search" or "database search" or "electronic search" or "handsearch*" or "hand search*" or "keyword search" or "literature search" or "search term*" or "literature review" or "overview of reviews" or "review literature" or "reviewed the literature" or "reviews studies" or "scoping stud*" or "overview study" or "meta-ethnograph*" or "meta-epidemiological" or "data extraction" or "meta-regression" or "narrative review" or "art review" or "scoping review" or "iterative review" or "meta-summary"))).ti,ab,id. (114458)

61 (((overview* or "synthesis" or "systematic" or evidence) and "reviews") or (umbrella or ((summary or analysis or review) and (articles and reviews))))).ti. or ("umbrella review" or "metareview" or "meta-review").ab,id. (750)

62 60 or 61 (114570)

63 35 and 59 (42110)

64 7 and 63 (13042)

65 limit 63 to (100 childhood <birth to age 12 yrs> or 120 neonatal <birth to age 1 mo> or 140 infancy <2 to 23 mo> or 160 preschool age <age 2 to 5 yrs> or 180 school age <age 6 to 12 yrs> or 200 adolescence <age 13 to 17 yrs> or 320 young adulthood <age 18 to 29 yrs>) (14716)

66 64 or 65 (19873)

67 62 and 66 (475)

68 limit 66 to ("0830 systematic review" or 1200 meta analysis or 1300 metasynthesis) (183)

69 67 or 68 (484)

70 limit 69 to yr="2007 -Current" (455)

71 limit 70 to (afrikaans or albanian or arabic or bulgarian or catalan or chinese or czech or danish or dutch or finnish or french or georgian or german or greek or hebrew or hindi or hungarian or iranian or italian or japanese or korean or lithuanian or malaysian or nonenglish or norwegian or polish or portuguese or romanian or russian or serbo croatian or slovak or slovene or spanish or swedish or turkish or ukrainian) (21)

72 71 not 70 (0)

73 70 not 71 (434)

Appendix 2.2 Coding Tool

Table 2.2.1 Map coding tool

Doman	Codes
Date <i>Please code date of publication</i>	<ul style="list-style-type: none"> • 2018 • 2017 • 2016 • 2015 • 2014 • 2013 • 2012 • 2011 • 2010 • 2009 • 2008
Focus <i>Of screen-based activity</i>	<ul style="list-style-type: none"> • Screen Time • Internet use • Problematic / Addictive internet use • Social media • Internet gaming disorder • Gaming/E-Gaming • Cyberbullying • Sexting • Smartphone Use
Aim of review <i>Tick all that apply</i>	<ul style="list-style-type: none"> • SR of relationship between focus and MH outcomes <i>e.g. relationship between social media and mental health Consequences/Correlates of focus</i> • Risk factors / consequences of focus <i>e.g. what might predict e-gaming disorder, problematic internet use, perpetration or victimisation in cyberbullying Precursors or Antecedents of a mental health outcome</i> • SR of people's experiences of focus and impact on mental health
Country Focus <i>Based on the SR inclusion criteria, not the description of included primary studies</i>	<ul style="list-style-type: none"> • No country filter applied/Not stated • High Income or OECD countries • Low or LMIC country focus
Population Focus: Age <i>This is coded based on who they stated they were interested in</i>	<ul style="list-style-type: none"> • No age filter/Not stated • CYP only <i>This refers to youth up to the end of formal education, i.e. age 25</i>

Doman	Codes
<i>(inclusion criteria), not the focus of the individual studies they finally included</i>	<p>years. Add age range if specified by authors.</p> <ul style="list-style-type: none"> • CYP & Adults <i>i.e. 'general population'</i>
Review Population Characteristics <i>Similarly, this is to be coded based on the review scope / who they said they were interested in (eligibility criteria), not the population characteristics of included studies</i>	<ul style="list-style-type: none"> • No population filter/targeting • Healthy CYP <i>no mental health problems</i> • CYP with mental health issues <i>Where authors are interested in populations where people may or may not be diagnosed with mental health issues such as:</i> <i>Depression</i> <i>Anxiety</i> <i>Eating disorders</i> <i>Schizophrenia</i> <i>CYP who self-harm</i> <i>Code ADHD as 'other'.</i> <i>Internet addiction and internet gaming disorder remains contested, do not code MH for this group.</i> • LGBTQ+ CYP • Children & YP with other characteristics <i>Provide details</i>
Study Designs included <i>Code based on study design inclusion criteria not the final set of included studies.</i>	<ul style="list-style-type: none"> • No study design filter <i>i.e. no specific targeting specified</i> • Cross-sectional <i>i.e. authors targeted cross-sectional studies</i> • Longitudinal <i>i.e. authors targeted longitudinal studies</i> • Qualitative studies (add info) <i>E.g. focus groups, structured and semi-structured interviews, ethnographies, etc.</i>
Date range searched <i>Provide the date range if reported in the methods section. Do not base this on the date range of included studies</i>	<ul style="list-style-type: none"> • Stated (add dates) • Not stated
Number of included papers <i>This should reflect the number of papers that passed inclusion screening, not the number of studies or the number of studies that were analysed/synthesised</i>	<ul style="list-style-type: none"> • Stated • Not stated
Type of synthesis <i>There is a synthesis, when: --two or more studies are combined to provide a synthetic statement on the direct of associations: e.g. three studies found an association between use of social media and loneliness.</i>	<ul style="list-style-type: none"> • Summative synthesis <i>e.g. 'authors conducted a narrative synthesis' (not further referenced)</i> • Meta-analysis • Other synthesis • Qualitative evidence synthesis <i>e.g. critical interpretive synthesis, grounded theory, properly referenced narrative synthesis</i> • No synthesis <i>Just 'lists' the findings</i>
Outcomes	<ul style="list-style-type: none"> • Qualitative Only • Risk factors longitudinal (risk or protective) <ul style="list-style-type: none"> • Mental health outcomes <ul style="list-style-type: none"> • Depression

Doman	Codes
	<ul style="list-style-type: none"> • Anxiety • Loneliness • Hostility/Aggression • Obsessive/Compulsive • Psychosis/Schizoid tendencies • Suicidality • ADHD Symptoms/Self-Regulation • Autism ▪ Psychosocial and other outcomes <ul style="list-style-type: none"> • Self-Esteem • Wellbeing/Life Satisfaction • Stress/Distress • Social support/social skills • Peer problems/bullying • Sexual behaviour/sexual health • Demographics • Parenting/family factors • School factors • Adverse Childhood Events (ACE) • Peer-factors • Personality traits • Attitudes/norms • Personality traits
	<ul style="list-style-type: none"> • MH consequences longitudinal • Mental health outcomes <ul style="list-style-type: none"> • Depression • Anxiety • Loneliness • Hostility/Aggression • Obsessive/Compulsive • Psychosis/Schizoid tendencies • Suicidality • ADHD Symptoms/Self-Regulation • Autism ▪ Psychosocial and other outcomes <ul style="list-style-type: none"> • Self-Esteem • Wellbeing/Life Satisfaction • Stress/Distress • Social support/social skills • Peer problems/bullying • Sexual behaviour/sexual health • Demographics • Parenting/family factors • School factors • Adverse Childhood Events (ACE) • Peer-factors • Personality traits • Attitudes/norms
	<ul style="list-style-type: none"> • Association [studies mostly cross-sectional, causal statements cannot be made] • Mental health outcomes <ul style="list-style-type: none"> • Depression • Anxiety

Doman	Codes
	<ul style="list-style-type: none"> • Loneliness • Hostility/Aggression • Obsessive/Compulsive • Psychosis/Schizoid tendencies • Suicidality • ADHD Symptoms/Self-Regulation • Autism ▪ Psychosocial and other outcomes <ul style="list-style-type: none"> • Self-Esteem • Wellbeing/Life Satisfaction • Stress/Distress • Social support/social skills • Peer problems/bullying • Sexual behaviour/sexual health • Demographics • Parenting/family factors • School factors • Adverse Childhood Events (ACE) • Peer-factors • Personality traits • Attitudes/norms • Personality traits

Appendix 2.3 AMSTAR 2

Table 2.3.2 AMSTAR 2 adapted coding tool

Question	Guidance	Answer
<p>1. Review question and inclusion criteria: <i>Did the research questions and inclusion criteria for the review include the components of PICO?</i></p>	<p>Is there an explicit aim/research question and inclusion criteria? FOCUS ON P + O</p> <p>P = Population I = Intervention, Prognostic Factor, Exposure (CAN BE n/A) C = Comparison (Can be None or placebo.) O = IV + DV (Outcome) (what are they trying to measure? [only relevant for quant])</p>	<p>Yes No</p>
<p>2. Protocol <i>Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?</i></p>	<p><u>For Yes:</u> The authors state that they had a written protocol or guide that included ALL the following:</p> <ul style="list-style-type: none"> - review question(s) - a search strategy - inclusion/exclusion criteria - a risk of bias assessment <p>* the protocol should be registered and should also have specified:</p> <ul style="list-style-type: none"> - a meta-analysis/synthesis plan, if appropriate, and - a plan for investigating causes of heterogeneity - justification for any deviations <p><u>For partial Yes:</u> The authors state that they had a written protocol or guide that included ALL the following:</p> <ul style="list-style-type: none"> - review question(s) - a search strategy 	<p>Yes Partial yes No</p>

Question	Guidance	Answer
	<ul style="list-style-type: none"> - inclusion/exclusion criteria - a risk of bias assessment <p><u>No</u></p>	
<p>3. Study designs included Did the review authors explain their selection of the study designs for inclusion in the review?</p>	<p><u>Yes:</u> For Yes, the review should satisfy ONE of the following:</p> <ul style="list-style-type: none"> - Explanation for including observational studies (including longitudinal and cross sectional) <p>No</p>	<p>Yes</p> <p>No</p>
<p>4. Search strategy Did the review authors use a comprehensive literature search strategy?</p>	<p><u>Yes</u></p> <ul style="list-style-type: none"> - searched at least 2 databases (relevant to research question) - provided key word and/or search strategy - justified publication restrictions (e.g. language) - searched ref lists of included studies - searched grey literature - conducted search within 24mths of completion of review <p>No</p> <p><u>Partial Yes</u></p> <p>All of the following:</p> <ul style="list-style-type: none"> - searched at least 2 relevant databases - provided keyword and/or search strategy 	<p>Yes</p> <p>Partial yes</p> <p>No</p>
<p>5. Double screening Did the review authors perform study selection in duplicate?</p>	<p><u>Yes:</u> For Yes, either ONE of the following:</p> <ul style="list-style-type: none"> - at least two reviewers independently agreed on selection of eligible studies and achieved consensus on which studies to include OR two reviewers selected a sample of eligible studies and achieved good agreement (at least 80 percent), with the remainder selected by one reviewer. <p><u>No</u></p>	<p>Yes</p> <p>No</p>
<p>6. Double data extraction? Did the review authors perform data extraction in duplicate?</p>	<p><u>Yes:</u> For Yes, either ONE of the following:</p> <ul style="list-style-type: none"> - at least two reviewers achieved consensus on which data to extract from included studies - OR two reviewers extracted data from a sample of eligible studies and achieved good agreement (at least 80 percent), with the remainder extracted by one reviewer. <p><u>No</u></p>	<p>Yes</p> <p>Partial yes</p> <p>No</p>
<p>7. Excludes reported Did the review authors provide a list of excluded studies and justify the exclusions?</p>	<p><u>Yes:</u> For yes provided a list of all potentially relevant studies that were read in full-text form but excluded from the review not enough to report numbers and reasons. Need references too.</p> <p><u>Partial Yes:</u> reports numbers with reasons but no references</p> <p>NO</p>	
<p>8. Description of studies Did the review authors describe the included studies in adequate detail? [what is adequate</p>	<p>Yes</p> <ul style="list-style-type: none"> described population in detail described research designs described IV and DV/outcome in detail described study's setting timeframe for follow-up described interventions [if relevant] described comparators [if relevant] <p><u>Partial Yes</u></p> <ul style="list-style-type: none"> described populations described IV and DV/outcomes described research designs 	<p>Yes</p> <p>Partial Yes</p> <p>No</p>

Question	Guidance	Answer
	described interventions [if relevant] described comparators [if relevant] No	
9. Quality Appraisal Did the review authors quality appraise the included studies?	For Yes, must also have assessed risk of bias: - from confounding, and - from selection bias - methods used to ascertain IV and DV - selection of the reported result from among multiple measurements or analyses of a specified outcome [only if multiple measures e.g., in longitudinal research] <u>Partial Yes</u> For Partial Yes, must have assessed RoB: - from confounding, and - from selection bias review? <u>No</u>	Yes Partial Yes No
10. Funding for included studies Did the review authors report on the sources of funding for the studies included in the review?	<u>Yes</u> : For yes must have reported on the sources of funding for individual studies included in the review. Note: Reporting that the reviewers looked for this information but it was not reported by study authors also qualify. <u>No</u>	Yes No
11. Meta-analysis If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?	<u>Yes</u> For NRSI For Yes: - The authors justified combining the data in a meta-analysis - AND they used an appropriate weighted technique to combine study results, adjusting for heterogeneity if present - AND they statistically combined effect estimates from NRSI that were adjusted for confounding, rather than combining raw data, or justified combining raw data when adjusted effect estimates were not available - AND they reported separate summary estimates for RCTs and NRSI separately when both were included in the review <u>No</u> N/A (no MA conducted)	Yes No N/A
12. Quality in meta-analysis If meta-analysis was performed, did the review authors assess the potential impact of QUALITY [originally RoB] in individual studies on the results of the meta-analysis or other evidence synthesis?	<u>Yes</u> For Yes :the authors performed analyses to investigate possible impact of Risk of Bias on findings <u>No</u> N/A (no MA conducted)	
13. Quality in interpretation Did the review authors account for quality appraisal in individual studies when interpreting/ discussing the results of the review?	<u>Yes</u> For Yes: the review provided a discussion of the likely impact of RoB on the results [not possible if ROB is not discussed in context of included studies] <u>Partial yes</u> : the review provided a discussion of the likely impact of bias e.g. in terms of study designs used <u>No</u>	Yes Partial Yes No
14. Heterogeneity Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	<u>Yes</u> For Yes: There was no significant heterogeneity in the results OR if heterogeneity was present the authors performed an investigation of sources of any heterogeneity in the results and discussed the impact of this on the results of the review <u>No</u> N/A (no MA conducted)	

Question	Guidance	Answer
<p>15. Publication bias <i>If they performed quantitative synthesis [i.e., pooled results rather than summative] did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?</i></p>	<p><u>Yes</u> For Yes performed graphical or statistical tests for publication bias and discussed the likelihood and magnitude of impact of publication bias</p> <p><u>No</u> <u>N/A</u> (no MA conducted)</p>	<p>Yes No N/A</p>
<p>16. Conflict / review funding <i>Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review</i></p>	<p><u>Yes</u> The authors reported no competing interests OR The authors described their funding sources and how they managed potential conflicts of interest</p> <p><u>No</u></p>	

Appendix 3: Further details of included reviews

Appendix 3.2: Screen time

Table 3.2.1 Characteristics of screen time reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ⁶	Mental health and psychosocial outcomes	Other variables
Carson et al. (2016)	Geographical location: No filter Population: CYP & Young adults only Other targeting: Healthy CYP Study design: Quantitative ⁷	2010 to 2014	235 ⁸	Summative	Associations (Cross-sectional) (179)	<ul style="list-style-type: none"> • Behavioural/emotional conduct/pro-social behaviour unspecified • Self-esteem 	<ul style="list-style-type: none"> • School factors
					Longitudinal (49) (consequences)	<ul style="list-style-type: none"> • Behavioural/emotional conduct/pro-social behaviour unspecified 	<ul style="list-style-type: none"> • Physical health • School factors
Costigan et al. (2013)	Geographical location: No filter Population: CYP & Young adults only Other targeting: None Study design: Quantitative (cross-sectional, longitudinal, or experimental)	All publication years to December 2011	33	Summative	Associations (Mixed: 25 cross-sectional and 8 longitudinal)	<ul style="list-style-type: none"> • Depression • Self-esteem • Wellbeing/life satisfaction • Social support/social skills 	<ul style="list-style-type: none"> • Physical health • Sleep
					Longitudinal (8) (consequences)		<ul style="list-style-type: none"> • Physical health

⁶ Numbers vary by outcome. Number refers to the n of papers adopting a cross-sectional or longitudinal design.

⁷ Sample size thresholds were set for various designs but design not limited

⁸ Two experimental studies, 233 observational study design including longitudinal ($n = 49$), case-control ($n = 5$), and cross-sectional ($n = 179$).

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ⁶	Mental health and psychosocial outcomes	Other variables
Dennison et al. (2016)	<p>Geographical location: No filter</p> <p>Population: CYP & Young adults only</p> <p>Other targeting: None</p> <p>Study design: Quantitative (cross-sectional or longitudinal cohort study)</p>	Not stated	12 (Screen time)	Summative	Associations (Mixed: 10 cross-sectional, 2 longitudinal)	<ul style="list-style-type: none"> • Depression 	<ul style="list-style-type: none"> • Demographics
Hoare et al. (2016)	<p>Geographical location: No filter</p> <p>Population: CYP & Young adults only</p> <p>Other targeting: Healthy CYP</p> <p>Study design: Quantitative (Cross-sectional or longitudinal associations, intervention)</p>	Database inception to January 2016	32	Summative	Associations (Cross-sectional) (24)	<ul style="list-style-type: none"> • Depression • Anxiety. • Loneliness • Suicidality • Other mental health • Self-esteem • Wellbeing/life satisfaction • Stress/distress 	<ul style="list-style-type: none"> • Demographics • Physical health
					Longitudinal (6)(Consequence)	<ul style="list-style-type: none"> • Depression • Self-esteem 	N/A
					(Risk factors / precursors)	<ul style="list-style-type: none"> • Depression 	N/A
Le Blanc et al. (2012)	<p>Geographical location: No filter</p> <p>Population: CYP & Young adults only</p> <p>Other targeting: None</p> <p>Study design: Quantitative (RCT, quasi-experimental, intervention, prospective cohort, or any study)</p>	1948 to 2011	21	Summative	Longitudinal (19) (consequences)	<ul style="list-style-type: none"> • Behavioural/emotional conduct/pro-social (general/unspecified) • Hostility/aggression • Well-being and satisfaction • Peer problems/bullying 	<ul style="list-style-type: none"> • Physical health • Cognitive development

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ⁶	Mental health and psychosocial outcomes	Other variables
	that has a comparison or a follow-up period) ⁹						
Liu et al. (2016)	Geographical location: No filter Population: CYP & Young adults only Other targeting: None Study design: Quantitative (observational cross-sectional, case-control or longitudinal)	Database inception to 2015	16	Meta-analysis	Associations (Cross-sectional) (12)	•Depression	•Demographics
					Longitudinal (4)(Consequences)	•Depression	•Demographics
Minges et al. (2015)	Geographical location: No filter Population: CYP & Young adults only Other targeting: None Study design: Qualitative	2001 to 2014	6	Qualitative (thematic)	N/A	N/A	N/A
Mitrofan et al. (2009)	Geographical location: No filter Population: CYP & Young adults only Other targeting: CYP with behavioural and emotional difficulties Study design: Mixed (quantitative and qualitative)	Database inception to 2006	12 ¹⁰	Summative	Associations (Cross-sectional) (2)	• Behavioural/emotional conduct/pro-social (general/unspecified)	N/A
Poitras (2017)	Geographical location: No filter		96 from 73	Summative	Associations (62 Cross-sectional or 5	•Hostility/aggression and health	• Cognitive development • Physical health

⁹ Longitudinal studies were included if at least one age measurement from the 0- to 4-years -old period was included

¹⁰ 7 experimental studies; 2 case control, 2 cross sectional surveys, 1 qualitative study

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ⁶	Mental health and psychosocial outcomes	Other variables
	Population: CYP & Young adults only Other targeting: Healthy CYP Study design: Quantitative (RCT, case control, longitudinal, longitudinal and cross-sectional, cross-sectional)	1946 to April 2016	unique samples ¹¹		additionally reported cross-sectional)	<ul style="list-style-type: none"> • Behavioural/emotional conduct/pro-social (general/unspecified) • Social support/social skills • Peer problems/bullying 	
					Longitudinal (25)(consequences)	<ul style="list-style-type: none"> • Depression • Anxiety • Hostility/aggression • Cognitive development • Behavioural/emotional conduct/pro-social behaviour unspecified • Self-esteem • Wellbeing/life satisfaction • Social support/social skills • peer problems/bullying 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • Physical health
Tremblay et al. (2011)	Geographical location: None Population: CYP & Young adults only Other targeting: None Study design: Quantitative ¹²	Database inception to 2010.	232 ¹³	Summative and meta-analysis ¹⁴	Associations (Cross-sectional) (177)	<ul style="list-style-type: none"> • Depression • Behavioural/emotional conduct/pro-social (general/unspecified) • Self-esteem 	<ul style="list-style-type: none"> • Physical health • School factors
					Longitudinal (37) (consequences)	<ul style="list-style-type: none"> • Behavioural/emotional conduct/pro-social (general/unspecified) • School Factors • Self-esteem 	

¹¹ RCT (1), case control (3), longitudinal (25), longitudinal with additional cross-sectional, cross-sectional (62)

¹² Sample size limits were applied but not type of study design

¹³ 8 RCTs, 10 intervention studies, 37 longitudinal studies and 177 cross-sectional. There were 17 on screen time specifically but these data were not analysed separately

¹⁴ High heterogeneity limited meta-analysis to RCTs examining the relationship between television viewing and BMI.

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

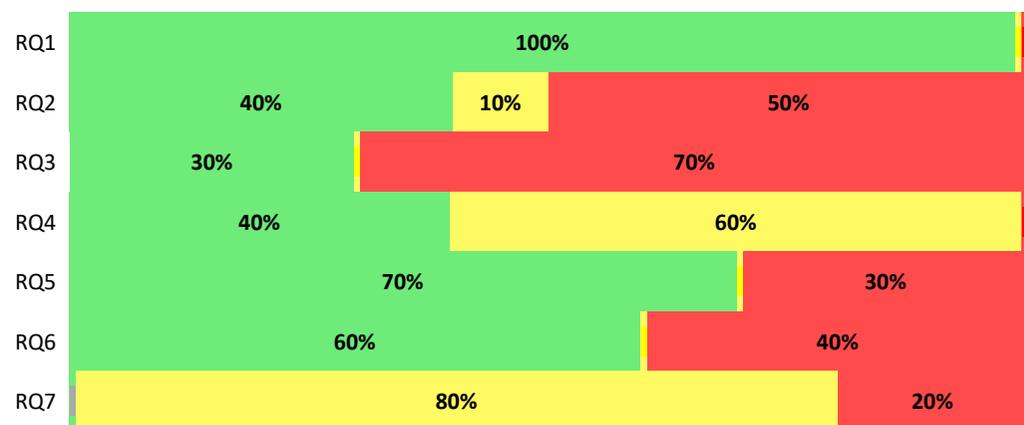
Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ⁶	Mental health and psychosocial outcomes	Other variables
Suchert (2015)	Geographical location: No filter Population: CYP & Young adults only Other targeting: None Study design: Quantitative (All study designs were eligible)	Database inception up to October 2013	91 ¹⁵	Summative	Associations (Cross-sectional) (73)	<ul style="list-style-type: none"> • Depression • Anxiety • ADHD symptoms/self-regulation • Behavioural/emotional conduct/pro-social (general/unspecified) • Self-esteem • Wellbeing/life satisfaction 	• Demographics
					Longitudinal (7)(consequences)	<ul style="list-style-type: none"> • Depression • Anxiety • ADHD symptoms/Self-Regulation/executive function • Behavioural/emotional conduct/pro-social (general/unspecified) • Self-esteem • Wellbeing/life satisfaction 	• Demographics

¹⁵ Papers on composite measure of screen time were not analysed separately.

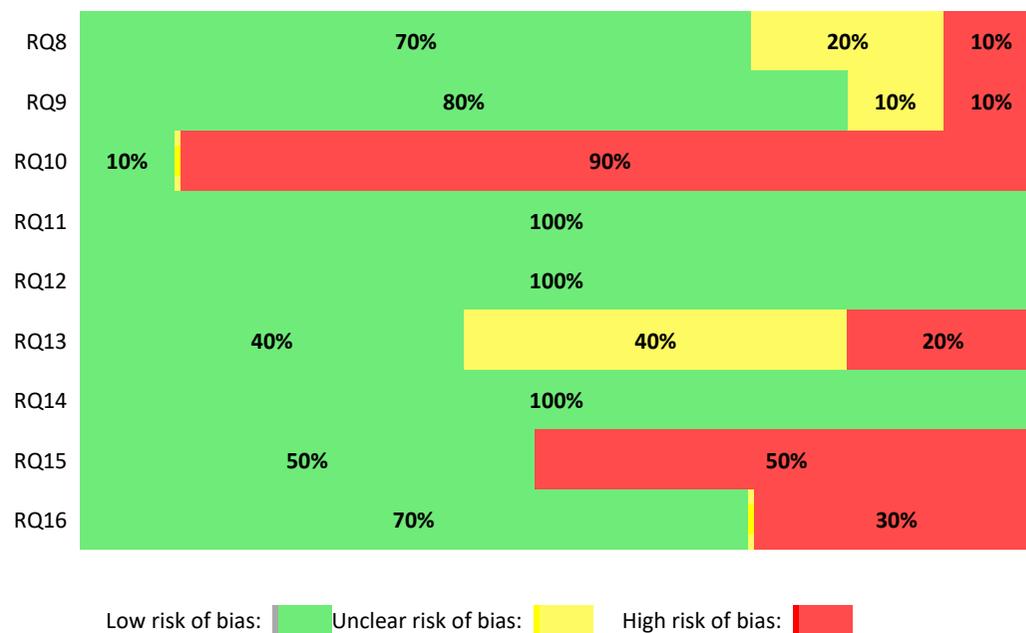
Table 3.2.2 Screen time: risk of bias assessment of included reviews

Author and Year	1. Review question / inclusion criteria stated	2. Protocol?	3. Study design inclusion criteria	4. Comprehensive search strategy?	5. Duplicate screening?	6. Duplicate data extraction?	7. Exclusions?	8. Included studies described?	9. Quality assessment?	10. Funding stated?	11. Appropriate meta-analysis methods?	12. QA impact on meta-analysis?	13. Quality in interpretation	14. Heterogeneity explored?	15. Publication bias	16. Conflict of interest stated?	Overall rating
Carson et al. (2016)	+	+	+	±	+	+	±	+	+	-	n/a	n/a	±	n/a	n/a	+	High
Costigan et al. (2013)	+	-	-	+	-	-	±	±	+	-	n/a	n/a	+	n/a	n/a	-	Medium
Dennison et al. (2016)	+	-	-	±	+	-	-	-	-	-	n/a	n/a	-	n/a	n/a	-	High
Hoare et al. (2016)	+	+	-	±	+	-	±	+	+	-	n/a	n/a	+	n/a	n/a	+	High
Le Blanc et al. (2012)	+	+	+	+	+	+	±	+	±	+	n/a	n/a	±	n/a	n/a	+	High
Liu et al. (2016)	+	-	-	±	+	+	±	+	+	-	+	+	+	+	+	+	High
Mitrofan et al. (2009)	+	-	-	+	-	+	-	+	+	-	n/a	n/a	±	n/a	n/a	-	High
Poitras et al. (2017)	+	+	+	+	+	+	±	+	+	-	n/a	n/a	+	n/a	n/a	+	High
Tremblay et al. (2011)	+	±	-	±	+	+	±	±	+	-	+	+	±	+	-	+	High
Suchert (2015)	+	-	-	±	-	-	±	+	+	-	n/a	n/a	-	n/a	n/a	+	Medium

+ = yes, low risk of bias; - = no high risk of bias; ± = partial yes, N/A = not applicable



Screen-based activities and children and young people’s mental health: A Systematic Map of Reviews



Appendix 3.3 Internet Use

Table 3.3.1 Characteristics of internet use reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ¹⁶	Mental health and psychosocial outcomes	Other variables
Daine et al. (2013)	Geographical location: No filter Population: CYP & Young Adults only) Other targeting: CYP with mental health issues Study design: No limits	December 26th 2011 for all articles printed between 1991 and 2011 service.	16	Summative	Associations (Mixed: 9 cross-sectional, 3 mixed methods (n=3) 4 qualitative	<ul style="list-style-type: none"> • Suicidality • Self-harm • Stress/distress • Depression • Social support/Social connectedness 	N/A
Huang (2010)	Geographical location: No filter Population: No filter Other targeting: None Study design: No limits	up to June 2008	40	Meta-analysis	Associations (Mixed: cross-sectional and longitudinal studies) NR	<ul style="list-style-type: none"> • Depression • Anxiety • Self-esteem • Wellbeing/life satisfaction • Stress/distress • Loneliness 	N/A
Prizant-Passal et al. (2016)	Geographical location: No filter Population: No filter Other targeting: None Study design: No limits	1990 to 2013	23	Summative	Associations (Cross-sectional studies (23)	<ul style="list-style-type: none"> • Anxiety 	<ul style="list-style-type: none"> • Demographics • Social comfort • Internet use factors
Rodgers & Melioli (2016)	Geographical location: No filter Population:	Not stated <i>over the last two decades</i>	67	Summative	Associations (Mixed: cross-sectional, longitudinal studies	<ul style="list-style-type: none"> • Body image • Eating concerns • Self esteem 	<ul style="list-style-type: none"> • Demographics • Internet use factors

¹⁶ Numbers vary by outcome. Number refers to the n of papers adopting a cross-sectional or longitudinal design.

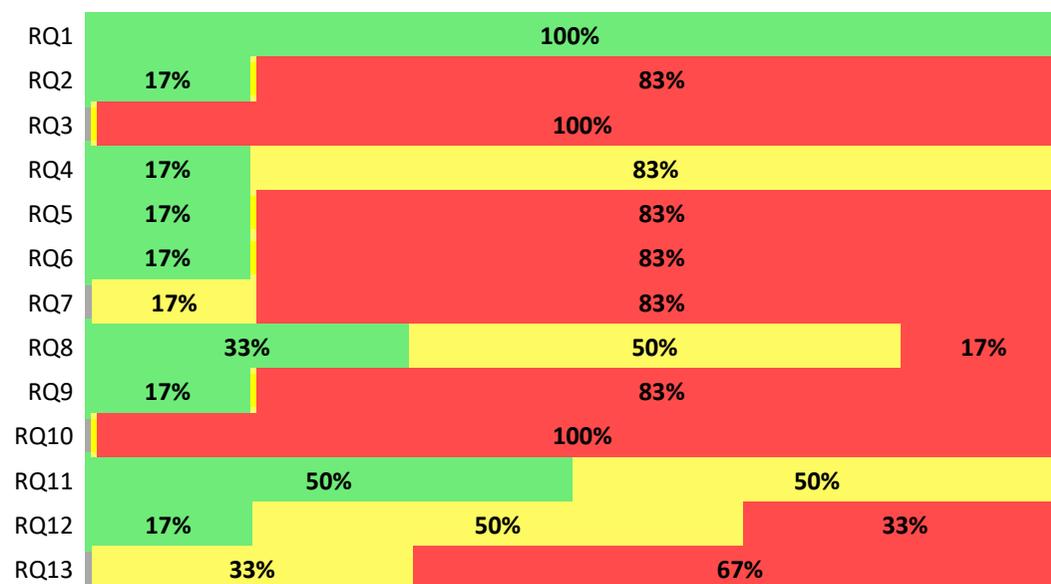
Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ¹⁶	Mental health and psychosocial outcomes	Other variables
	No filter Other targeting: None Study design: No limits				and secondary analysis of online forum (n=56)	<ul style="list-style-type: none"> • Anxiety • Depression • Stress/distress 	
Tokunaga (2017)	Geographical location: No filter Population: No filter Other targeting: None Study design: No limits	Not stated	247	Meta-analysis	Associations (Mixed: cross-sectional and longitudinal studies)	<ul style="list-style-type: none"> • Depression • Loneliness 	<ul style="list-style-type: none"> • Demographics • Internet use factors
Wu et al. (2016)	Geographical location: No filter Population: CYP & Young Adults only Other targeting: Healthy CYP CYP with mental health Study design: No limits	1980 to 2015	12	Summative	Associations (Mixed 10 cross-sectional 2 qualitative)	<ul style="list-style-type: none"> • Depression • Anxiety • Loneliness • Social support/Social connectedness 	N/A

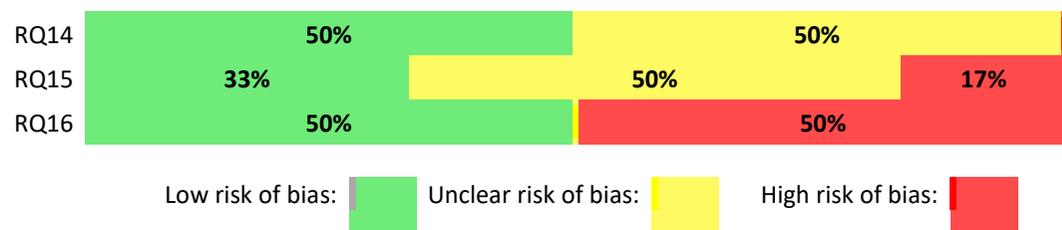
Table 3.3.2 Internet Use: risk of bias assessment of included reviews

Author and Year	1. Review question / inclusion criteria	2. Protocol?	3. Study design inclusion criteria	4. Comprehensive search strategy?	5. Duplicate screening?	6. Duplicate data extraction?	7. Exclusions?	8. Included studies described?	9. Quality assessment?	10. Funding stated?	11. Appropriate meta-analysis methods?	12. QA impact on meta-. analysis?	13. Quality in interpretation	14. Heterogeneity explored?	15. Publication bias	16. Conflict of interest stated?	Overall rating
Daine et al. (2013)	+	+	-	±	-	+	-	+	+	-	?	?	±	?	?	-	Low
Huang (2010)	+	-	-	±	-	-	-	+	-	-	+	-	-	+	-	+	Low
Prizant-Passal et al. (2016)	+	-	-	+	-	-	±	±	-	-	+	+	±	+	+	-	Medium
Rodgers & Melioli (2016)	+	-	-	±	-	-	-	±	-	-	?	?	-	?	?	+	Low
Tokunaga (2017)	+	-	-	±	-	-	-	-	-	-	+	-	-	+	+	-	Low
Wu et al. (2016)	+	-	-	±	+	-	-	±	-	-	?	?	-	?	?	+	Medium

+ = yes, low risk of bias; - = no high risk of bias; ± = partial yes, N/A = not applicable



Screen-based activities and children and young people's mental health: A Systematic Map of Reviews



Appendix 3.4 Problematic/addictive Internet Use

Table 3.4.1 Characteristics of problematic/addictive internet reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ¹⁷	Mental health and psychosocial outcomes	Other variables
Anderson et al. (2017)	<p>Geographical location: No filter</p> <p>Population: CYP & Young adults only</p> <p>Other targeting: Healthy CYP</p> <p>Study design: Longitudinal surveys</p>	1994 to 2016	29	Summative	Longitudinal (29) (Risk factors/precursors)	<ul style="list-style-type: none"> • Depression • Anxiety • Hostility/Aggression • Obsessive/Compulsive • ADHD Symptoms/Self-Regulation • Autism • Substance misuse • Self-Esteem • Wellbeing/Life Satisfaction • Social support/ skills • Loneliness • Peer problems/bullying • Other mental health 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • School factors • Personality traits
Carli et al. (2012)	<p>Geographical location: No filter</p> <p>Population: No filter</p> <p>Other targeting: None</p> <p>Study design: Quantitative</p>	No restrictions	20 ¹⁸	Summative	Associations (Mixed 17 cross-sectional and 1 longitudinal)	<ul style="list-style-type: none"> • Depression • Anxiety • Hostility/Aggression • Obsessive/Compulsive • ADHD Symptoms/Self-Regulation • Other mental health 	<ul style="list-style-type: none"> • Demographics

¹⁷ Numbers vary by outcome. Number refers to the n of papers adopting a cross-sectional or longitudinal design.

¹⁸ Cohort study (1) case-control (2) cross-sectional (17)

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ¹⁷	Mental health and psychosocial outcomes	Other variables
Fumero et al. (2018)	<p>Geographical location: No filter</p> <p>Population: CYP & Young adults only</p> <p>Other targeting: studies comparing participants with and without internet addiction</p> <p>Study design: Quantitative (cross-sectional, case-control and cohort)</p>	2002 to November 2017.	28 ¹⁹	Meta-analysis	Associations (Mixed 20 cross-sectional and 6 longitudinal)	<ul style="list-style-type: none"> • Depression • Anxiety • Hostility/Aggression • Self-Esteem • Social support/ skills • Peer problems/bullying 	<ul style="list-style-type: none"> • Parenting/family factors
Ho et al. (2014)	<p>Geographical location: No filter</p> <p>Population: No filter</p> <p>Other targeting: None</p> <p>Study design: Quantitative (cross-sectional, case-control and cohort)</p>	2002 to November 2017.	8 ²⁰	Meta-analysis	Associations (Mixed (2 cross-sectional and 2 longitudinal) ²¹	<ul style="list-style-type: none"> • Depression • Anxiety • ADHD Symptoms/Self-Regulation • Substance misuse 	N/A

¹⁹ case control (2); cross-sectional(20), longitudinal (6)

²⁰ case control (6); cross-sectional(2), longitudinal (2)

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ¹⁷	Mental health and psychosocial outcomes	Other variables
Kayis et al. (2016)	Geographical location: No filter Population: No filter Other targeting: None Study design: Quantitative	No restrictions	12	Meta-analysis	Associations (NR)	<ul style="list-style-type: none"> • Internet addiction 	<ul style="list-style-type: none"> • Personality traits
Koo et al. (2014)	Geographical location: No filter Population: CYP & Young adults only Other targeting: Korean children Study design: Quantitative	1999 to 2012	95 (54 related to internet addiction)	Meta-analysis	Associations (Cross-sectional 95 (54 related to internet addiction))	<ul style="list-style-type: none"> • Depression • Anxiety • Hostility/Aggression • ADHD symptoms/Self-Regulation • Self-Esteem • Wellbeing/Life Satisfaction • Stress/Distress • Social support/ skills • Loneliness • Peer problems/bullying • Other mental health 	<ul style="list-style-type: none"> • Parenting/family factors • School factors • Personality traits
Lam (2014)	Geographical location: No filter Population: CYP & Young adults only Other targeting: None Study design: Quantitative (Longitudinal)	From database inception to June 2014	9	Summative	Longitudinal (8 precursors, Risk factors/precursors)	<ul style="list-style-type: none"> • Depression • Anxiety • Loneliness • Hostility/Aggression • ADHD Symptoms/Self-Regulation • Other mental health 	<ul style="list-style-type: none"> • Parenting/family factors • School factors
					Longitudinal (1) (consequence)	<ul style="list-style-type: none"> • Depression 	N/A

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ¹⁷	Mental health and psychosocial outcomes	Other variables
Mahapatra et al. (2018)	<p>Geographical location: No filter</p> <p>Population: No filter</p> <p>Other targeting: None</p> <p>Study design: Quantitative (cross-sectional, case-control, and cohort)</p>	All publication years (till April 2017).	12	Summative	Associations (Cross-sectional) (12)	<ul style="list-style-type: none"> • Depression • Anxiety • Hostility/aggression • Obsessive/compulsive • Suicidality • Attachment issues • Self-esteem • Loneliness • Other mental health 	• Personality traits/temperament
Marchant et al. (2017)	<p>Geographical location: No filter</p> <p>Population: CYP & Young adults only</p> <p>Other targeting: Populations that use the internet for reasons related to suicidal ideation and or self-harm</p> <p>Study design: Mixed (quantitative and qualitative)</p>	January 2011 to January 2015	51	Summative	Associations (Cross-sectional)(NR)	<ul style="list-style-type: none"> • Suicidality • Wellbeing/life satisfaction • Loneliness 	• Demographics
Wang et al. (2017)	<p>Geographical location: No filter</p> <p>Population: No filter</p> <p>Other targeting: None</p> <p>Study design: Quantitative (cohort, case control and cross-sectional)</p>	Database inception to June 2016	15	Meta-analysis	Associations (Mixed 13 Cross-sectional and 2 longitudinal)	• ADHD symptoms/Self-Regulation	• Demographics

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ¹⁷	Mental health and psychosocial outcomes	Other variables

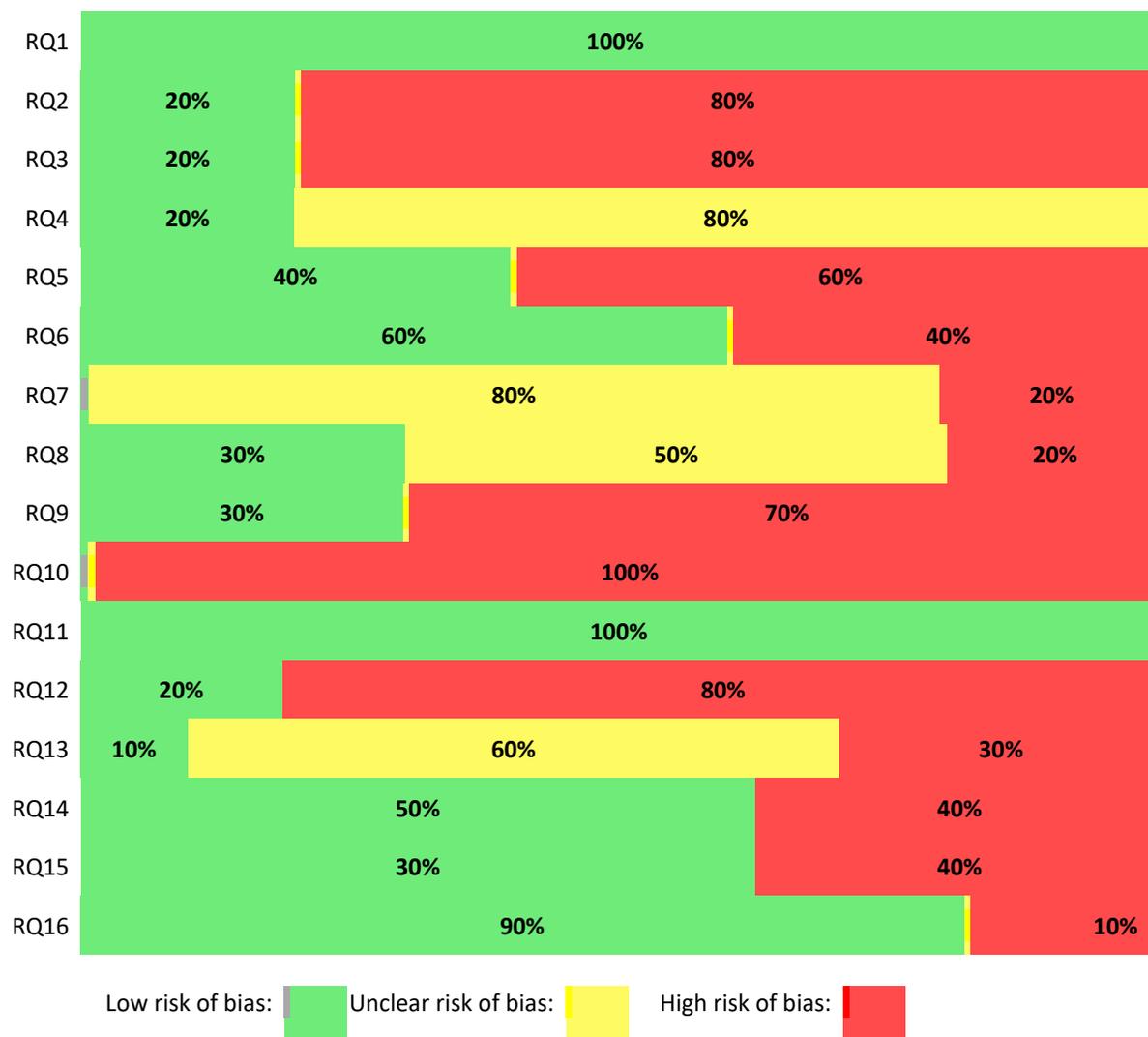
NR=not reported

Table 3.4.2 Problematic/addictive internet use: risk of bias assessment of included reviews

Author and Year	1. Review question / inclusion criteria stated	2. Protocol?	3. Study design inclusion criteria	4. Comprehensive search strategy?	5. Duplicate screening?	6. Duplicate data extraction?	7. Exclusions?	8. Included studies described?	9. Quality assessment?	10. Funding stated?	11. Appropriate meta-analysis methods?	12. QA impact on meta-analysis?	13. Quality in interpretation	14. Heterogeneity explored?	15. Publication bias	16. Conflict of interest stated?	Overall rating
Anderson et al. (2017)	+	-	+	±	-	-	-	±	-	-	N/A	N/A	-	N/A	N/A	+	Low
Carli et al. (2012)	+	-	-	±	-	-	±	±	-	-	N/A	N/A	±	N/A	N/A	+	Medium
Fumero et al. (2018)	+	-	-	±	-	-	±	±	+	-	+	-	±	-	-	+	Medium
Ho et al. (2014)	+	-	-	±	+	+	±	±	-	-	+	-	±	+	+	+	Medium
Kayis et al. (2016)	+	-	-	±	-	+	±	±	-	-	+	-	±	-	+	-	Medium
Koo et al. (2014)	+	-	-	±	+	+	±	±	-	-	+	-	±	+	-	+	Medium
Lam (2014)	+	-	-	+	-	-	-	+	-	-	N/A	N/A	-	N/A	N/A	+	Low
Mahapatra et al. (2018)	+	-	-	±	-	+	±	+	-	-	N/A	N/A	±	N/A	N/A	+	Medium
Marchant et al. (2017)	+	+	-	±	+	+	±	±	+	-	N/A	N/A	-	N/A	N/A	+	High
Wang et al. (2017)	+	+	+	+	+	+	±	+	+	-	+	+	+	+	+	+	High

+ = yes, low risk of bias; - = no high risk of bias; ± = partial yes, N/A = not applicable

Screen-based activities and children and young people’s mental health: A Systematic Map of Reviews



Appendix 3.5 Social Media

Table 3.5.1 Characteristics of social media reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ²²	Mental health and psychosocial outcomes	Other variables
Allen et al. (2014)	Geographical location: No filter Population: CYP & Young Adults only Other targeting: Healthy CYP CYP with mental health issues Study Designs No limits	2004-2014	11 studies	Summative synthesis	Associations (Mixed) NR	<ul style="list-style-type: none"> • Social Support/ /Social Connectedness • Identity development 	N/A
Baker & Algorta (2016)	Geographical location No filter Population: CYP & Adults only Other targeting: Healthy CYP Study Designs No limits	Up to April 2016	30	Summative synthesis	Associations (Mixed: 27 Cross-sectional 3 longitudinal 3)	<ul style="list-style-type: none"> • Depression 	N/A
Best et al. (2014)	Geographical location: No filter Population: CYP & Young Adults Other targeting: None Study Designs No limits	1st January 2003–11th April 2013.	43	Summative synthesis	Associations (Mixed: 32 quantitative, 9 Qualitative 12 Mixed/other 2)	<ul style="list-style-type: none"> • Depression • Anxiety • Loneliness • Self-Esteem • Social Support/Social Connectedness • Social Capital • Identity development 	N/A
Christoffersen (2016)	Geographical location No filter	2005 to 2016	15	Summative synthesis	Associations (Mixed (NR)	<ul style="list-style-type: none"> • Social Support/Social Connectedness • Wellbeing/Life Satisfaction 	<ul style="list-style-type: none"> • Social media use factors

²² Numbers vary by outcome. Number refers to the n of papers adopting a cross-sectional or longitudinal design.

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ²²	Mental health and psychosocial outcomes	Other variables
	<p>Population CYP & Young Adults only</p> <p>Other targeting: None</p> <p>Study Designs No limits</p>					<ul style="list-style-type: none"> • Identity development 	
Clifton et al. (2013)	<p>Geographical location: No filter</p> <p>Population: CYP & Young Adults only</p> <p>Other targeting: None</p> <p>Study Designs No limits</p>	1980-2012	21	No synthesis	Associations (Mixed (NR))	<ul style="list-style-type: none"> • Anxiety • Loneliness • Wellbeing/Life Satisfaction • Peer problems/bullying 	N/A
Curtis et al. (2018)	<p>Geographical location: No filter</p> <p>Population: CYP & Young Adults only</p> <p>Other targeting: Healthy CYP</p> <p>Study Designs No limits</p>	before January 2017	19	Meta-analysis	Associations (19 cross-sectional)	<ul style="list-style-type: none"> • Substance misuse/risky behaviours 	N/A
Dobrea & Păsărelu. (2016)	<p>Geographical location: No filter</p> <p>Population: No filter</p> <p>Other targeting: None</p> <p>Study Designs No limits</p>	Not stated	20	Summative synthesis	Associations (20 cross-sectional)	<ul style="list-style-type: none"> • Anxiety 	N/A
Dyson et al. (2016)	<p>Geographical location: No filter</p>	up to April 24, 2013 and updated	26	Summative synthesis	Associations (Mixed: (5 cross-sectional; 9 Descriptive; 11	<ul style="list-style-type: none"> • Suicidality/self-harm 	N/A

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ²²	Mental health and psychosocial outcomes	Other variables
	<p>Population: CYP & Young Adults only</p> <p>Other targeting: CYP with mental health issues</p> <p>Study Designs No limits</p>	June 2014 (Medline only)			Qualitative, 1 Mixed Methods)		
Erfani & Abedin (2018)	<p>Geographical location: No filter</p> <p>Population: No filter</p> <p>Other targeting: None</p> <p>Study Designs No limits</p>	2003 to 2016	22	Summative synthesis	Associations (22 cross-sectional)	<ul style="list-style-type: none"> • Loneliness • Self-Esteem • Social Support/ Social Connectedness • Wellbeing/Life Satisfaction • Social Capital 	<ul style="list-style-type: none"> • Social media use factors
Frost et al. (2017)	<p>Geographical location: No filter</p> <p>Population: CYP & Adults</p> <p>Other targeting: None</p> <p>Study Designs No limits but excluded qualitative studies</p>	2004 to 2016	65	Summative synthesis	Associations (Mixed: 65 cross-sectional and 2 longitudinal component)	<ul style="list-style-type: none"> • Depression • Anxiety • Hostility/Aggression • Obsessive/Compulsive • Psychosis/Schizoid • Body image/disordered eating • Substance misuse/risky behaviours • Personality traits/temperament 	
Holland & Tiggemann (2016)	<p>Geographical location: No filter</p> <p>Population: CYP & Young Adults only</p> <p>Other targeting: None</p> <p>Study Designs No limits</p>	up to May 2015	20	Summative synthesis	Associations (20 cross-sectional)	<ul style="list-style-type: none"> • Body image/disordered eating 	<ul style="list-style-type: none"> • Demographics • Social media use factors
					Longitudinal (5) (consequences)	<ul style="list-style-type: none"> • Body image/disordered eating 	

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ²²	Mental health and psychosocial outcomes	Other variables
Marino et al. (2018a)	<p>Geographical location: No filter</p> <p>Population: No filter</p> <p>Other targeting: None</p> <p>Study Designs No limits</p>	Not stated	47 papers	Meta-analysis	Associations (47 cross-sectional)	<ul style="list-style-type: none"> • Self-Esteem 	<ul style="list-style-type: none"> • Demographics • Personality traits/temperament • Social media use factors
Marino et al. (2018b)	<p>Geographical location: No filter</p> <p>Population: No filter</p> <p>Other targeting: None</p> <p>Study Designs included <ul style="list-style-type: none"> • Cross-sectional/quantitative data. Qualitative studies narrative data excluded. </p>	Up to 2016	19	Meta-analysis	Associations (19 cross-sectional)	<ul style="list-style-type: none"> • Depression • Anxiety • Stress/Distress • Wellbeing/Life Satisfaction 	
McCrae et al. (2017)	<p>Geographical location: No filter</p> <p>Population: CYP & Young Adults only</p> <p>Other targeting: <ul style="list-style-type: none"> • Healthy CYP </p> <p>Study Designs No limits</p>	Not stated	11	Meta-analysis	Associations (7 cross-sectional)	<ul style="list-style-type: none"> • Depression 	
					Longitudinal (4) (Risk factors/precursors)	<ul style="list-style-type: none"> • Depression 	
Nolan et al. (2017)	<p>Geographical location: No filter</p> <p>Population: CYP & Young Adults only</p> <p>Other targeting: Adolescent mothers</p>	up to April 2015	8	Summative synthesis	Associations (Mixed:1 action research, 3 content analysis, 2 Cross-sectional 2 Longitudinal/ Experimental)	<ul style="list-style-type: none"> • Social Support/Social Connectedness • Social Capital 	

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ²²	Mental health and psychosocial outcomes	Other variables
	Study Designs No limits						
Mubarak & Mubarak (2015)	Geographical location: No filter Population: CYP & Young Adults only Other targeting: Healthy CYP Study Designs No limits	Not stated	29	Summative synthesis	Associations (Mixed: 19 quantitative, 3 qualitative, 6 mixed methods)	<ul style="list-style-type: none"> • Peer problems/bullying 	<ul style="list-style-type: none"> • Demographics • Personality traits/temperament • Social media use factors
Rice et al. (2016)	Geographical location: High Income or OECD countries Population: CYP & Young Adults only Other targeting: Indigenous young people in Australia: Study Designs No limits	Not stated	22	Qualitative evidence synthesis	Qualitative	N/A	
Seabrook et al. (2016)	Geographical location: No filter Population: CYP & Adults Other targeting: None Study Designs Quantitative studies (no grey literature).	2005 to 2016.	70	Summative synthesis	Associations (70 cross-sectional)	<ul style="list-style-type: none"> • Depression • Anxiety • Social Support/ Social Connectedness • Wellbeing/Life Satisfaction 	<ul style="list-style-type: none"> • Social media use factors
Twomey & O'Reilly (2017)	Geographical location: No filter Population: No filter	Date range searched <ul style="list-style-type: none"> • Not stated 	21	Summative synthesis	Associations (21 cross-sectional)	<ul style="list-style-type: none"> • Anxiety • Bipolar/mania • Attachment issues • Self-Esteem 	<ul style="list-style-type: none"> • Personality traits/temperament

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised ²²	Mental health and psychosocial outcomes	Other variables
	Other targeting: None Study Designs No limits					<ul style="list-style-type: none"> • Stress/Distress • Social Support Social Connectedness • Wellbeing/Life Satisfaction 	

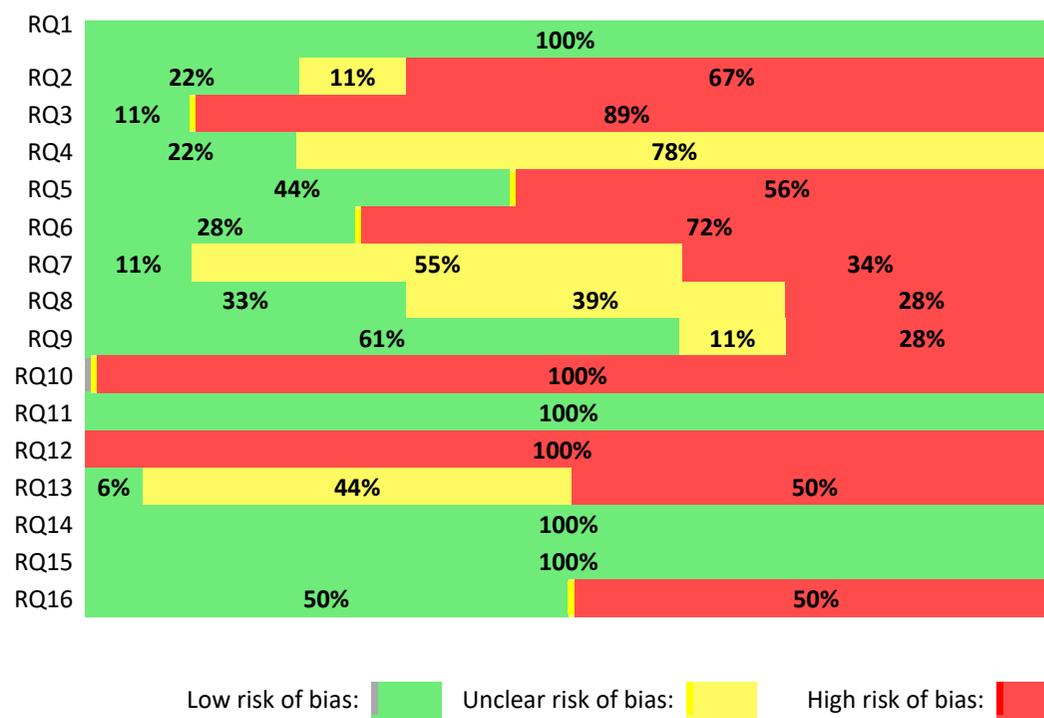
Table 3.5.2 Social media: risk of bias assessment of included reviews

Author and Year	1. Review question stated	2. Protocol?	3. Inclusion criteria	4. Comprehensive search strategy?	5. Duplicate screening?	6. Duplicate data Extraction?	7. Exclusions?	8. Included studies described?	9. Quality assessment?	10. Funding stated?	11. Appropriate meta-analysis methods?	12. QA impact on meta-analysis?	13. Quality in interpretation	14. Heterogeneity explored?	15. Publication bias	16. Conflict of interest stated?	Overall rating
Allen et al. (2014)	+	-	-	±	-	-	-	-	-	-	N/A	N/A	-	N/A	N/A	-	Low
Baker & Algorta (2016)	+	-	-	±	-	-	-	-	+	-	N/A	N/A	-	N/A	N/A	+	Low
Best et al. (2014)	+	-	-	±	+	-	-	-	+	-	N/A	N/A	-	N/A	N/A	-	Low
Christofferson (2016)	+	-	-	±	-	-	-	-	?	-	N/A	N/A	±	N/A	N/A	-	Low
Clifton et al. (2013)	+	-	-	±	-	-	+	-	-	-	N/A	N/A	-	N/A	N/A	-	Low
Curtis et al. (2018)	+	+	-	+	+	-	+	+	-	-	+	-	±	+	+	+	Medium
Dobrea & Păsăreanu (2016)	+	+	+	±	+	-	±	+	-	-	N/A	N/A	-	N/A	N/A	+	Medium
Dyson et al. (2016)	+	±	-	±	+	+	±	±	+	-	N/A	N/A	±	N/A	N/A	+	High
Erfani & Abedin (2018)	+	+	-	±	+	+	±	+	+	-	N/A	N/A	-	N/A	N/A	-	High
Frost et al. (2017)	+	-	-	±	+	-	±	+	+	-	N/A	N/A	+	N/A	N/A	+	High
Holland & Tiggemann (2016)	+	-	-	±	-	-	±	±	+	-	N/A	N/A	±	N/A	N/A	-	Medium
Marino et al. (2018a)	+	-	-	+	-	+	±	±	-	-	+	-	±	+	+	-	Medium
Marino et al. (2018b)	+	±	-	+	-	+	±	+	+	-	+	+	±	+	+	+	Medium
McCrae et al. (2017)	+	+	+	±	+	+	±	+	+	-	+	-	±	+	+	+	High
Nolan (2017)	+	-	-	+	-	-	-	±	+	-	N/A	N/A	±	N/A	N/A	-	Low
Mubarak & Mubarak (2015)	+	-	-	±	-	-	-	±	+	-	N/A	N/A	-	N/A	N/A	-	Low

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and Year	1. Review question stated	2. Protocol?	3. Inclusion criteria	4. Comprehensive search strategy?	5. Duplicate screening?	6. Duplicate data Extraction?	7. Exclusions?	8. Included studies described?	9. Quality assessment?	10. Funding stated?	11. Appropriate meta-analysis methods?	12. QA impact on meta-analysis?	13. Quality in interpretation	14. Heterogeneity explored?	15. Publication bias	16. Conflict of interest stated?	Overall rating
Seabrook et al. (2016)	+	-	-	±	-	-	±	±	+	-	N/A	N/A	-	N/A	N/A	+	Medium
Twomey & O'Reilly (2017)	+	-	-	±	+	-	±	±	±	-	N/A	N/A	-	N/A	N/A	+	High

+ = yes, low risk of bias; - = no high risk of bias; ± = partial yes, N/A = not applicable



Appendix 3.6 Gaming

Table 3.6.1 Characteristics of gaming reviews

Author and year	Review characteristics	Date range searched	Number of included papers	Type of synthesis	Type of data synthesised ²³	Mental health and psychosocial outcomes	Other variables
Boyle et al. (2012)	Geographical location: No filter Population: No filter Other targeting: None Study design: No limits	1961 to 2011.	55 ²⁴	Summative	Associations (30 Surveys (design not reported, assume cross-sectional or mixed associations))	<ul style="list-style-type: none"> • Anxiety • Loneliness • Neurobiological factors • Wellbeing/life satisfaction • Stress/distress • Social support/ skills 	<ul style="list-style-type: none"> • Demographics • School Factors • Personality traits/temperament • Game factors (time, type) • Gaming to meet needs (e.g., esteem) • Behavioural beliefs • Escapism • Sleep
					Quasi experimental (consequences)	<ul style="list-style-type: none"> • Patho/physiology • Wellbeing/life satisfaction 	
Ferguson (2015)	Geographical location: No filter Population: CYP & Young adults only Other targeting: None Study design: Quantitative	up to February 2014 (start date not stated)	101 ²⁵	Meta-analysis	Associations (Mixed: 64 Correlational and 31 Longitudinal)	Depression <ul style="list-style-type: none"> • Hostility/aggression • ADHD symptoms/Self-Regulation 	<ul style="list-style-type: none"> • Demographics • School Factors
					Longitudinal/experimental (31) (consequences)	<ul style="list-style-type: none"> • Hostility/aggression 	N/A

²³ Numbers vary by outcome. Number refers to the n of papers adopting a cross-sectional or longitudinal design.

²⁴ surveys (30) were the most frequently used designs followed by quasi-experiments (19), with qualitative studies (3) and RCTs (2)

²⁵ Cross-sectional (64); longitudinal (31); experimental (19)

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Number of included papers	Type of synthesis	Type of data synthesised ²³	Mental health and psychosocial outcomes	Other variables
Kuss & Griffiths (2012a)	Geographical location: No filter Population: No filter Other targeting: None Study design: No limits	2007 to 2016	58	Summative	Associations (Mixed: frequencies by design not reported, assume cross-sectional or mixed associations)	<ul style="list-style-type: none"> • Depression • Anxiety • Loneliness • Hostility/aggression • Suicidality • ADHD symptoms/Self-Regulation/ • Patho/physiology • Other mental health • Substance misuse • Self-esteem • Wellbeing/life satisfaction • Stress/distress • Social support/skills 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • School Factors • Game factors (time, type) • Gaming to meet needs (e.g., esteem) • Escapism
Kuss and Griffiths (2012b)	Geographical location: No filter Population: CYP & Young adults only Other targeting: Health Study design: Empirical (mixed qualitative and quantitative)	2001 to 2011	30	Summative	Associations (Mixed: frequencies by design not reported, assume cross-sectional or mixed associations)	<ul style="list-style-type: none"> • Depression • Anxiety • Loneliness • hostility/aggression • ADHD symptoms/Self-Regulation/executive function • Patho/physiology • Substance misuse • Self-esteem 	<ul style="list-style-type: none"> • Personality traits /temperament • Gaming to meet needs(e.g., esteem) • Escapism • Sleep
Mihara et al. (2017)	Geographical location: No filter Population: No filter Other targeting: None	From database inception to May 2016	50	Summative	Associations (37 Cross-sectional associations)	<ul style="list-style-type: none"> • Depression • Anxiety • Loneliness • Hostility/aggression • Suicidality 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • School factors • Personality traits/temperament • Sleep

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Number of included papers	Type of synthesis	Type of data synthesised ²³	Mental health and psychosocial outcomes	Other variables
	Study design: Quantitative (Cross-sectional /Longitudinal)					<ul style="list-style-type: none"> • ADHD symptoms/Self-Regulation • Substance misuse • Self-esteem • Wellbeing/life satisfaction • Social support/skills • Peer problems/bullying 	Game factors (time, type) <ul style="list-style-type: none"> • Behavioural beliefs
					Longitudinal (13) (Risk factors/precursors)	<ul style="list-style-type: none"> • Depression • Anxiety • Loneliness • Hostility/Aggression • ADHD Symptoms/Self-Regulation • Self-Esteem • Social support/skills 	<ul style="list-style-type: none"> • Demographics • School factors • Game factors (type, time) • Behavioural beliefs
					Longitudinal (13) (consequences)	<ul style="list-style-type: none"> • Depression • Anxiety • Hostility/Aggression • Social support/skill • Substance misuse 	<ul style="list-style-type: none"> • School factors
Paulus et al. (2018)	Geographical location: No filter Population: CYP & Young adults only Other targeting: None	1991 to 2016.	252 ²⁶	Summative	Associations (Mixed: frequencies by design not reported, assume cross-sectional or mixed associations)	<ul style="list-style-type: none"> • Depression • Anxiety • Loneliness • Suicidality • ADHD symptoms/Self-Regulation 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • School factors • Personality traits/temperament • Gaming to meet needs (e.g., esteem)

²⁶ articles, books, and book chapters (vs. studies).

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Number of included papers	Type of synthesis	Type of data synthesised ²³	Mental health and psychosocial outcomes	Other variables
	Study design: No limits					<ul style="list-style-type: none"> • Neurobiological • Substance misuse • Self-esteem • Wellbeing/life satisfaction • Stress/distress • Social support/skills 	<ul style="list-style-type: none"> • Behavioural beliefs • Escapism • Sleep
Schneider et al. (2017)	Geographical location: No filter Population: CYP & Young adults only Other targeting: None Study design: Quantitative	Not stated	14	Summative	Associations (14 Cross-sectional associations)	N/A	<ul style="list-style-type: none"> • Demographics • Parenting/family factors
					Longitudinal (5) (risk/protective)	N/A	<ul style="list-style-type: none"> • Parenting/family factors
					Longitudinal (5) (consequences)	N/A	<ul style="list-style-type: none"> • Parenting/family factors
Scott & Porter-Armstrong (2013)	Geographical location: No filter Population: CYP & Young adults only Other targeting: None Study design: Mixed quantitative and qualitative	2002 to 2012	6	Summative	Associations (Mixed: 4 cross-sectional, 1 longitudinal, 1 qualitative)	<ul style="list-style-type: none"> • Depression • Anxiety • Loneliness • Stress/distress • Social support/skills 	<ul style="list-style-type: none"> • Parenting/family factors • School Factors • Escapism • Sleep

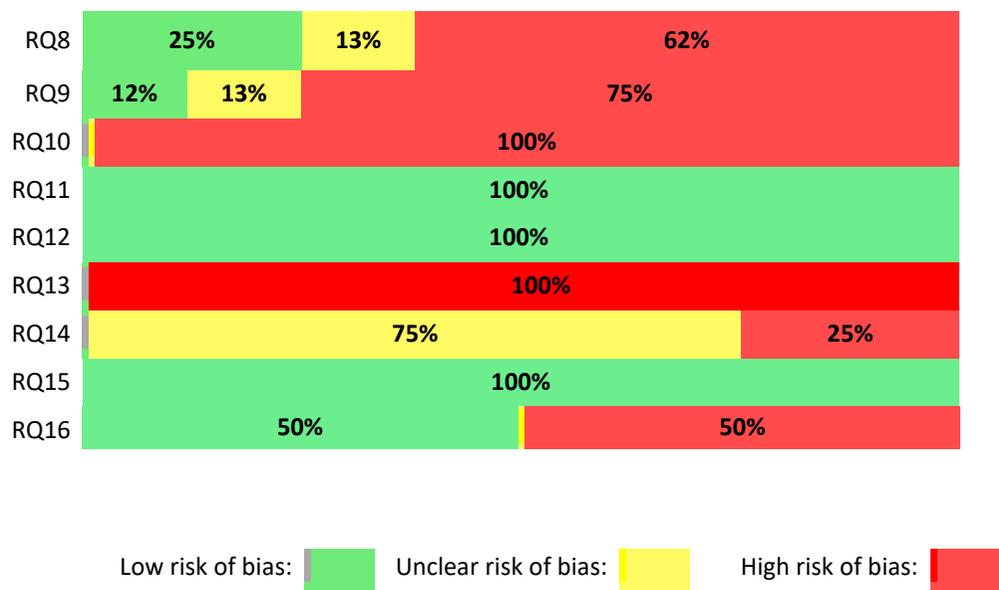
Table 3.6.2 Gaming: risk of bias assessment of included reviews

Author and Year	1. Review question stated	2. Protocol?	3. Inclusion criteria	4. Comprehensive search strategy?	5. Duplicate screening?	6. Duplicate data Extraction?	7. Exclusions?	8. Included studies described?	9. Quality assessment?	10. Funding stated?	11. Appropriate meta-analysis methods?	12. QA impact on meta-. analysis?	13. Quality in interpretation	14. Heterogeneity explored?	15. Publication bias	16. Conflict of interest stated?	Overall rating
Boyle et al. (2012)	-	-	-	±	-	-	-	±	-	-	N/A	N/A	-	N/A	N/A	-	Low
Ferguson (2015)	+	-	-	+	-	-	-	-	±	-	+	+	±	-	+	+	Low
Kuss & Griffiths (2012a)	+	-	-	±	-	-	-	+	-	-	N/A	N/A	±	N/A	N/A	-	Low
Kuss & Griffiths (2012a)	+	-	+	±	-	-	-	-	-	-	N/A	N/A	-	N/A	N/A	-	Low
Mihara (2017)	+	-	-	±	-	-	-	-	-	-	N/A	N/A	±	N/A	N/A	+	Low
Paulus et al. (2018)	+	-	+	+	-	-	±	-	-	-	N/A	N/A	±	N/A	N/A	+	Low
Schneider et al. (2017)	+	-	-	±	+	-	±	-	-	-	N/A	N/A	±	N/A	N/A	+	Low
Scott & Porter-Armstrong (2013)	+	-	-	±	-	-	-	+	+	-	N/A	N/A	±	N/A	N/A	-	Low

+ = yes, low risk of bias; - = no high risk of bias; ± = partial yes, N/A = not applicable



Screen-based activities and children and young people's mental health: A Systematic Map of Reviews



Appendix 3.7 Cyberbullying

Table 3.7.1 Characteristics of cyberbullying reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised	Mental health and psychosocial outcomes	Other variables
Aboujaoude et al. (2015)	Geographical location: No filter Population: CYP & Young Adults only Other targeting: Healthy CYP Study Designs: No filter	No date restriction	26	Summative synthesis	Associations (26 cross-sectional)	<ul style="list-style-type: none"> • Depression • Suicidality • Substance misuse • Stress/distress 	<ul style="list-style-type: none"> • Personality traits/temperament
Abreu and Kenny (2018)	Geographical location: No filter Population: CYP & Young Adults only Other targeting: LGBTQ+ CYP Study Designs: No filter	August 2016 to March 2017	27	Summative synthesis	Associations (Mixed: cross-sectional, mixed methods, and qualitative studies)	<ul style="list-style-type: none"> • Depression • Hostility/aggression • Suicidality • Self-esteem • peer problems/bullying 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • School factors • Personality traits/temperament
Baldry et al. (2015)	Geographical location: No filter Population: CYP & Young Adults only Other targeting: None Study Designs: No filter	2000 to February 2015	53	Summative synthesis	Associations (Mixed: cross-sectional, mixed methods, and qualitative studies)	<ul style="list-style-type: none"> • Depression • Anxiety • Substance misuse • Self-esteem • Peer problems/bullying 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • School factors • Personality traits/temperament
Bottino et al. (2015)	Geographical location: No filter Population: CYP & Young Adults only Other targeting: None Study Designs:	Not stated	10	Summative synthesis	Associations (10 cross-sectional)	<ul style="list-style-type: none"> • Depression • Anxiety • Hostility/aggression • Suicidality • Self-harm • Substance misuse • Self-esteem 	<ul style="list-style-type: none"> • Demographics • School factors • Personality traits/temperament

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised	Mental health and psychosocial outcomes	Other variables
	Cross-sectional					<ul style="list-style-type: none"> • Stress/distress • peer problems/bullying 	
Chen et al. (2017)	<p>Geographical location: No filter</p> <p>Population: No filter</p> <p>Study Designs: Quantitative</p> <p>Other targeting: None</p>	Not stated	81	Meta-analysis	Associations (81 cross-sectional)	<ul style="list-style-type: none"> • Depression • Self-esteem 	<ul style="list-style-type: none"> • Parenting/family factors • School factors • Social support/social skills
Fisher et al. (2016)	<p>Geographical location: US</p> <p>Population: CYP & Young Adults only</p> <p>Other targeting: None</p> <p>Study Designs: Quantitative</p>	Not stated	55	Meta-analysis	Associations (55 cross-sectional)	<ul style="list-style-type: none"> • Depression • Anxiety • Hostility/aggression • Suicidality • Self harm • Substance misuse • Stress • Self-esteem • Wellbeing/life satisfaction • Peer problems/bullying 	
Foody et al. (2017)	<p>Geographical location: Northern or the Republic of Ireland</p> <p>Population: CYP & Young Adults only</p> <p>Other targeting: Healthy CYP</p> <p>Study Designs: Quantitative</p>	January 1997 to April 2016	39	Meta-analysis	Associations (Mixed: cross-sectional, mixed methods, and qualitative studies)	<ul style="list-style-type: none"> • Depression • Anxiety • Suicidality • Self harm • Self-esteem • Wellbeing/life satisfaction • Peer problems/bullying 	<ul style="list-style-type: none"> • Demographics
Gini & Espelage (2014)	<p>Geographical location: No filter</p> <p>Population: CYP & Young Adults only</p>	1910 to 2013	34	Meta-analysis	Associations (34 cross-sectional)	<ul style="list-style-type: none"> • Suicidality 	

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised	Mental health and psychosocial outcomes	Other variables
	<p>Other targeting: None</p> <p>Study Designs: No filter</p>						
Gini (2018)	<p>Geographical location: No filter</p> <p>Population: CYP & Young Adults only</p> <p>Other targeting: Healthy CYP</p> <p>Study Designs: No filter</p>	?2009-2015	20	Meta-analysis	Associations (20 cross-sectional)	<ul style="list-style-type: none"> • Depression • Anxiety • Peer problems/bullying 	
Guo et al. (2016)	<p>Geographical location: No filter</p> <p>Population: CYP & Young Adults only</p> <p>Other targeting: Healthy CYP</p> <p>Study Designs: Quantitative</p>	Not stated	77	Meta-analysis	Associations (Mixed: cross-sectional, mixed methods, and qualitative studies)	<ul style="list-style-type: none"> • Internalizing problems • Externalizing problems 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • School factors • Personality traits/temperament
Hamm et al. (2015)	<p>Geographical location: No filter</p> <p>Population: CYP & Young Adults only</p> <p>Other targeting: None</p> <p>Study Designs: No filter</p>	January 2000 to June 2014	34	Summative synthesis	Associations (Mixed: cross-sectional, mixed methods, and qualitative studies)	<ul style="list-style-type: none"> • Depression • Anxiety • Hostility/aggression • Suicidality • Self harm • Substance misuse • Self-esteem • Stress/distress • Peer problems/bullying • Other mental health 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • School factors • Personality traits/temperament
Heerde & Hemphill (2018)	<p>Geographical location: No filter</p> <p>Population:</p>	1990 to 2018	27	Meta-analysis	Associations (Mixed: cross-sectional, mixed	<ul style="list-style-type: none"> • Self harm • Peer problems/bullying 	<ul style="list-style-type: none"> • Demographics

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised	Mental health and psychosocial outcomes	Other variables
	CYP & Young Adults only Other targeting: Healthy CYP Study Designs: No filter				methods, and qualitative studies)		
John et al. (2018)	Geographical location: No filter Population: CYP & Young Adults only Other targeting: Healthy CYP Study Designs: Cross-sectional	January 1996 to February 2017	33	Meta-analysis	Associations (Mixed: cross-sectional, mixed methods, and qualitative studies)	<ul style="list-style-type: none"> • Suicidality • Self harm 	
Klomek et al. (2010)	Geographical location: No filter Population: CYP & Young Adults only Other targeting: Healthy CYP Study Designs: Cross-sectional, longitudinal	No date restriction	31	Summative synthesis	Associations (Mixed: cross-sectional, mixed methods, and qualitative studies)	<ul style="list-style-type: none"> • Suicidality • Depression 	
Kowalski et al. (2014)	Geographical location: No filter Population: CYP & Young Adults only Study Designs: Cross-sectional Other targeting: Healthy CYP	No date restriction	131	Meta-analysis	Associations (131 cross-sectional)	<ul style="list-style-type: none"> • Depression • Anxiety • Loneliness • Hostility/aggression • Suicidality • Substance misuse • Self-esteem • Wellbeing/life satisfaction • Stress/distress • Other mental health 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • School factors • Personality traits/temperament

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

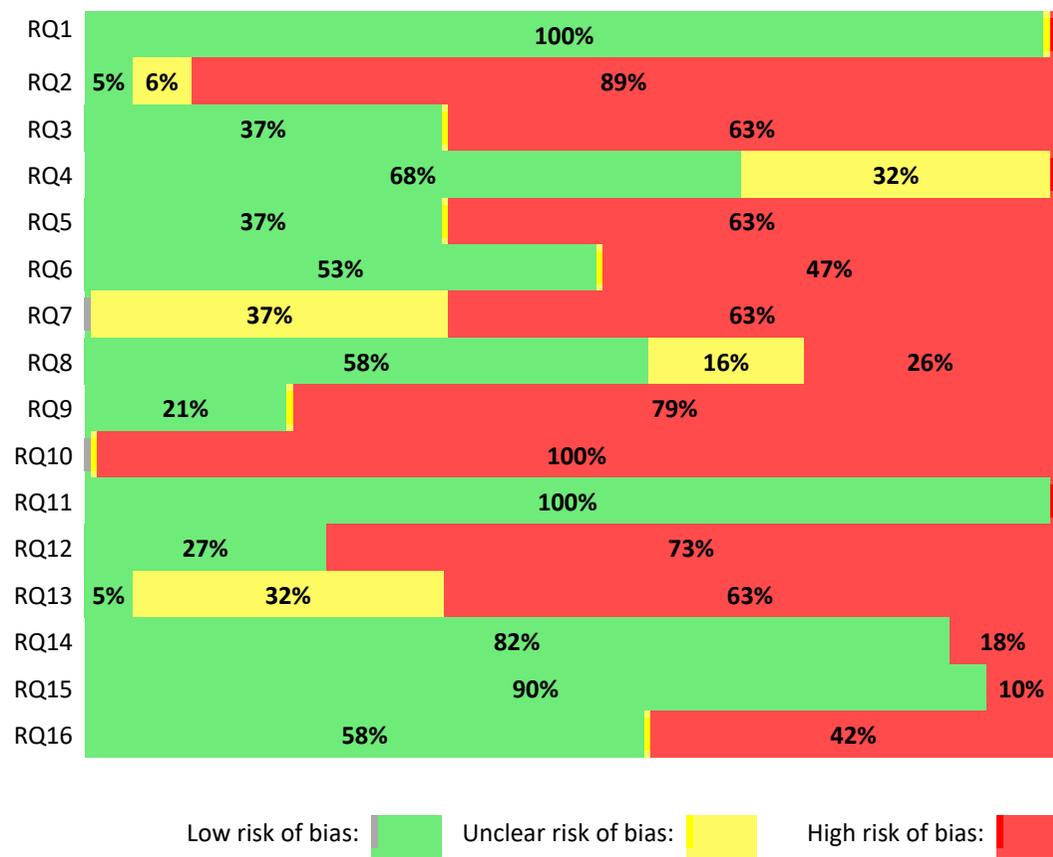
Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised	Mental health and psychosocial outcomes	Other variables
Lee et al. (2018)	<p>Geographical location: South Korea</p> <p>Population: CYP & Young Adults only</p> <p>Other targeting: Healthy CYP</p> <p>Study Designs: Quantitative, qualitative and mixed methods</p>	2005 to 2015	38	Summative synthesis	Associations (Mixed: cross-sectional, mixed methods, and qualitative studies)	<ul style="list-style-type: none"> • Depression • Anxiety • hostility/aggression • ADHD symptoms/self regulation • Self-esteem 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • School factors • Social support/social skills • Internet use
Tokunaga (2010)	<p>Geographical location: No filter</p> <p>Population: CYP & Young Adults only</p> <p>Study Designs: No filter</p> <p>Other targeting: Healthy CYP</p>	Publication prior to June 2009	25	Summative synthesis	Associations (25 cross-sectional)	<ul style="list-style-type: none"> • Depression • Anxiety • Self-esteem • Stress/distress 	<ul style="list-style-type: none"> • Demographics • Parenting/family factors • School factors • Personality traits/temperament
Van Geel et al. (2014)	<p>Geographical location: No filter</p> <p>Population: CYP & Young Adults only</p> <p>Study Designs: No filter</p> <p>Other targeting: Healthy CYP</p>	January 1910 to January 2013	36	Meta-analysis	Associations (36 cross-sectional)	<ul style="list-style-type: none"> • Suicidality 	
Yuchang et al. (2017)	<p>Geographical location: North America, Europe Australia, and China</p> <p>Population: CYP & Young Adults only</p> <p>Study Designs: Quantitative</p> <p>Other targeting: victims of bullying</p>	Not stated	56	Meta-analysis	Associations (Mixed: cross-sectional, mixed methods, and qualitative studies)	<ul style="list-style-type: none"> • Depression • Anxiety 	<ul style="list-style-type: none"> • Demographics

Table 3.7.2 Cyberbullying: risk of bias assessment of included reviews

Author and Year	1. Review question stated	2. Protocol?	3. Inclusion criteria	4. Comprehensive search strategy?	5. Duplicate screening?	6. Duplicate data Extraction?	7. Exclusions?	8. Included studies described?	9. Quality assessment?	10. Funding stated?	11. Appropriate meta-analysis methods?	12. QA impact on meta-analysis?	13. Quality in interpretation	14. Heterogeneity explored?	15. Publication bias	16. Conflict of interest stated?	Overall rating
Aboujaoude et al. (2015)	+	-	-	+	-	-	-	+	-	-	N/A	N/A	-	N/A	N/A	+	Low
Abreu and Kenny (2018)	+	-	+	+	+	+	-	+	-	-	N/A	N/A	-	N/A	N/A	+	Medium
Baldry et al. (2015)	+	-	-	±	-	-	-	-	-	-	N/A	N/A	-	N/A	N/A	+	Low
Bottino et al. (2015)	+	-	+	±	+	-	±	+	+	-	N/A	N/A	-	N/A	N/A	-	High
Chen et al. (2017)	+	-	-	±	-	+	±	±	-	-	+	-	-	+	-	-	Medium
Fisher et al. (2016)	+	-	+	+	+	+	±	±	+	-	+	+	+	+	+	+	High
Foody et al. (2017)	+	±	+	+	-	-	-	+	-	-	+	-	±	-	+	+	Low
Gini & Espelage (2014)	+	-	-	±	+	+	-	-	-	-	+	-	±	+	+	+	Low
Gini et al. (2018)	+	-	-	+	-	+	-	+	-	-	+	-	-	+	+	-	Low
Guo (2016)	+	-	-	+	-	+	±	+	-	-	+	-	±	+	+	-	Medium
Hamm et al. (2015)	+	-	-	+	+	+	±	±	+	-	N/A	N/A	-	N/A	N/A	+	Medium
Heerde & Hemphill (2018)	+	-	+	±	+	-	-	+	-	-	+	-	-	+	+	-	Medium
John et al. (2018)	+	+	-	+	+	+	±	+	+	-	+	+	±	+	+	+	High
Klomek et al. (2010)	+	-	+	+	-	-	-	-	-	-	N/A	N/A	±	N/A	N/A	+	Low
Kowalski et al. (2014)	+	-	-	+	-	+	-	-	-	-	+	+	±	+	+	-	Low
Lee et al. (2018)	+	-	+	+	-	-	-	+	-	-	N/A	N/A	-	N/A	N/A	-	Low
Tokunaga (2010)	+	-	-	+	-	-	-	+	-	-	N/A	N/A	-	N/A	N/A	-	Low
Van Geel et al. (2014)	+	-	-	+	-	+	±	+	-	-	+	-	-	-	+	+	Medium
Yuchang et al. (2017)	+	-	-	±	-	-	-	-	-	-	+	-	-	+	+	+	Low

+ = yes, low risk of bias; - = no high risk of bias; ± = partial yes, N/A = not applicable

Screen-based activities and children and young people’s mental health: A Systematic Map of Reviews



Appendix 3.8 Sexting

Table 3.8.1 Characteristics of sexting reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised	Mental health and psychosocial outcomes	Other variables
Anastassiou et al. (2017)	Geographical location No limits Population: CYP & Young Adults only Other targeting: None Study Designs: Qualitative studies	Not stated	8	Qualitative evidence synthesis	Qualitative	N/A	N/A
Barrense-Dias et al. (2017)	Geographical location No filter Population Focus: Age CYP & Young Adults only Other targeting: None Study Designs No filter	2012 to 2015.	18	Summative synthesis	Associations (Mixed 16 cross-sectional, 1 qualitative, 1 longitudinal)	<ul style="list-style-type: none"> • Depression • Anxiety • Alcohol/tobacco/drugs/violence/'deviant' behaviour • Bullying/Cyberbullying • Stress/distress • Social support /connectedness • Internet addiction • Sexual behaviour/sexual health 	<ul style="list-style-type: none"> • Demographics • Socio-economic factors • Parental factors • Personality traits • Attitudes/norms (about sexting)
Cooper et al. (2016)	Geographical location No filter Population: CYP & Young Adults only Other targeting: None Study Designs: No limits	2009-2014	88	No synthesis	Not reported	<ul style="list-style-type: none"> • Depression • Alcohol/tobacco/drugs/violence/'deviant' behaviour • Bullying/Cyberbullying 	N/A

Screen-based activities and children and young people's mental health: A Systematic Map of Reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised	Mental health and psychosocial outcomes	Other variables
Klettke et al. (2014)	Geographical location No filter Population: No limits Other targeting: None Study Designs No limits	2000 and August 2013	31	Summative synthesis	Associations (36 cross-sectional)	<ul style="list-style-type: none"> • Depression • Anxiety • Suicidality • Sexual behaviour/sexual health • Alcohol/tobacco/drugs/violence/'deviant' behaviour • Self-esteem • Stress/distress • Sad/hopeless 	<ul style="list-style-type: none"> • Demographics • Socio-economic factors • Adverse Childhood Events (ACE) • Peer-factors • Personality traits • Attitudes/norms • Technology use/behaviour
Smith et al. (2016)	Geographical location: No filter Population: CYP & Young Adults only Other targeting: None Study Designs: Cross-sectional	2005 and 2014	14	Summative synthesis Meta-analysis	Associations (36 cross-sectional)	<ul style="list-style-type: none"> • Sexual behaviour/sexual health • Alcohol/tobacco/drugs/violence /'deviant' behaviour 	
Van Ouytsel et al. (2015)	Geographical location No filter Population: CYP & Young Adults only Other targeting: None Study Designs: No limits	Date range searched • Stated (add dates) [Info] English-language peer-reviewed journal articles published between 2008 and 2014.	9	No clear synthesis	Associations (36 cross-sectional)	<ul style="list-style-type: none"> • Depression • Anxiety • Suicidality • Sexual behaviour/sexual health • Alcohol/tobacco/drugs/violence/'deviant' behaviour • Bullying/Cyberbullying • Stress/distress • Social support/connectedness • Sad/hopeless 	<ul style="list-style-type: none"> • Socio-economic factors • Parental factors • Adverse Childhood Events (ACE) • Peer-factors • Personality traits • Attitudes/norms

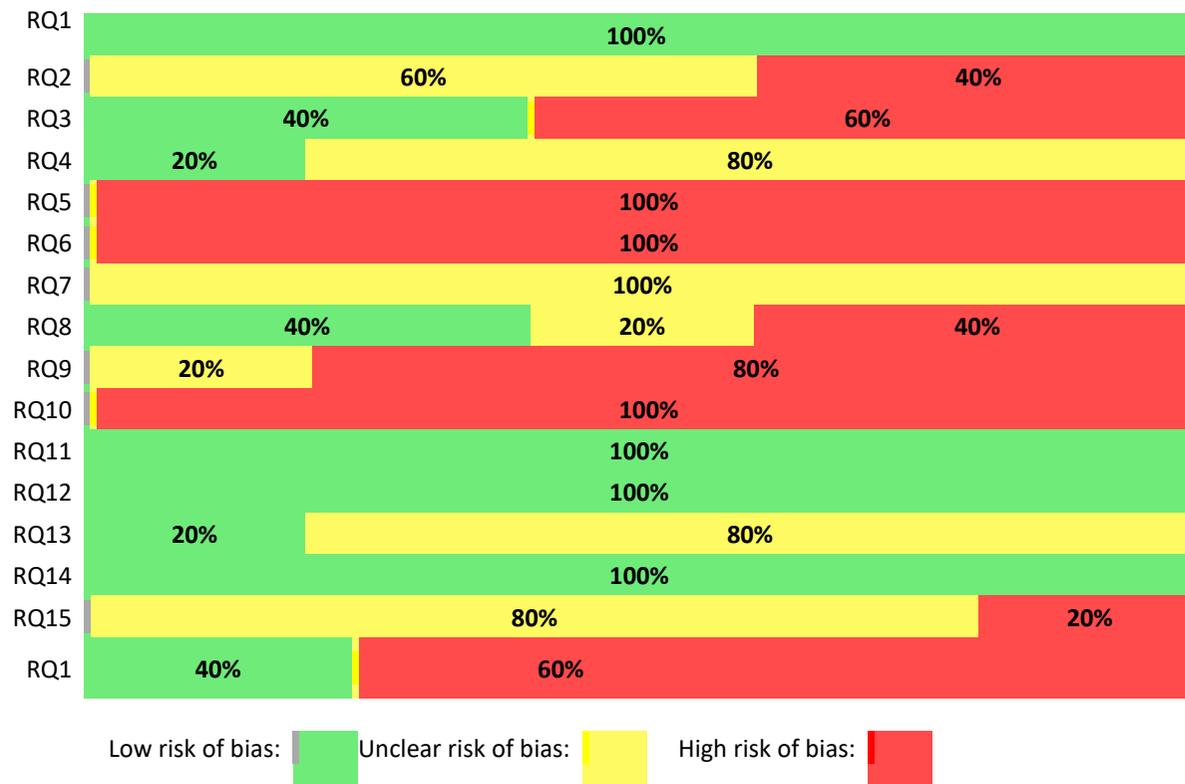
Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised	Mental health and psychosocial outcomes	Other variables
Wilkinson et al. (2016)	Geographical location: No filter Population: CYP & Young Adults only Other targeting: None Study Designs Qualitative	until the end of November 2015	5	Qualitative synthesis / Meta-ethnography	Qualitative	N/A	N/A

Table 3.8.2 Sexting: risk of bias assessment of included reviews

Author and Year	1. Review question stated	2. Protocol?	3. Inclusion criteria	4. Comprehensive search strategy?	5. Duplicate screening?	6. Duplicate data Extraction?	7. Exclusions?	8. Included studies described?	9. Quality assessment?	10. Funding stated?	11. Appropriate meta-analysis methods?	12. QA impact on meta- analysis?	13. Quality in interpretation	14. Heterogeneity explored?	15. Publication bias	16. Conflict of interest stated?	Overall rating
Barrense-Dias et al. (2017)	+	±	-	±	-	-	±	?	-	-	N/A	N/A	±	N/A	N/A	+	Medium
Cooper et al. (2016)	+	±	+	+	-	-	±	-	-	-	N/A	N/A	±	N/A	N/A	-	Low
Klettke et al. (2014)	+	-	-	±	-	-	±	-	-	-	N/A	N/A	±	N/A	N/A	-	Low
Smith et al. (2016)	+	-	-	±	-	-	±	+	±	-	+	+	+	+	-	-	Medium
Van Ouytsel et al. (2015)	+	±	+	±	-	-	±	+	-	-	N/A	N/A	±	N/A	N/A	+	Medium

+ = yes, low risk of bias; - = no high risk of bias; ± = partial yes, N/A = not applicable

Screen-based activities and children and young people’s mental health: A Systematic Map of Reviews



Appendix 3.9 Smartphone use

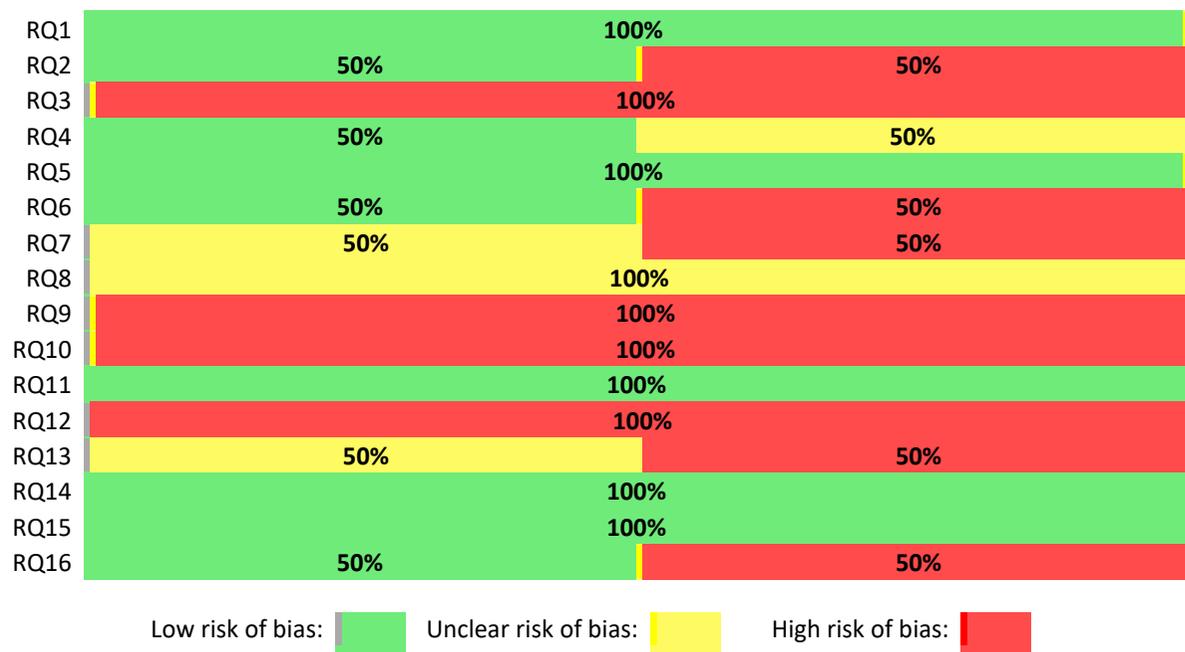
Table 3.9.1 Characteristics of smartphone use reviews

Author and year	Review characteristics	Date range searched	Included papers	Type of synthesis	Type of data synthesised	Mental health and psychosocial outcomes	Other variables
Elhai et al. (2017)	Geographical location: No filter Population: No limits Other targeting: None Study Designs: Quantitative	2008-2015	23	Summative synthesis	Cross-sectional	<ul style="list-style-type: none"> • Depression • Anxiety 	N/A
Vahedi (2018)	Geographical location: No filter Population: No limits Other targeting: None Study Designs: No limits	Not stated	37	Meta-analysis	Cross-sectional	<ul style="list-style-type: none"> • Stress • Anxiety 	N/A

Table 3.9.2 Smartphone use: risk of bias assessment of included reviews

Author and Year	1. Review question stated	2. Protocol?	3. Inclusion criteria	4. Comprehensive search strategy?	5. Duplicate screening?	6. Duplicate data Extraction?	7. Exclusions?	8. Included studies described?	9. Quality assessment?	10. Funding stated?	11. Appropriate meta-analysis methods?	12. QA impact on meta-. analysis?	13. Quality in interpretation	14. Heterogeneity explored?	15. Publication bias	16. Conflict of interest stated?	Overall rating
Elhai et al. (2017)	+	+	-	±	+	-	-	±	-	-	N/A	N/A	-	N/A	N/A	-	Medium
Vahedi et al. (2018)	+	-	-	+	+	+	±	±	-	-	+	-	±	+	+	+	Medium

Screen-based activities and children and young people’s mental health: A Systematic Map of Reviews



The Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) is part of the Social Science Research Unit (SSRU), UCL Institute of Education, University College London.

The EPPI-Centre was established in 1993 to address the need for a systematic approach to the organisation and review of evidence-based work on social interventions. The work and publications of the Centre engage health and education policymakers, practitioners and service users in discussions about how researchers can make their work more relevant and how to use research findings.

Founded in 1990, the Social Science Research Unit (SSRU) is based at the UCL Institute of Education, University College London. Our mission is to engage in and otherwise promote rigorous, ethical and participative social research as well as to support evidence-informed public policy and practice across a range of domains including education, health and welfare, guided by a concern for human rights, social justice and the development of human potential.

The views expressed in this work are those of the authors and do not necessarily reflect the views of the EPPI-Centre or the funder. All errors and omissions remain those of the authors.

First produced in 2019 by:

Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre)
Social Science Research Unit
UCL Institute of Education, University College London
18 Woburn Square
London WC1H 0NR

Tel: +44 (0)20 7612 6397

<http://eppi.ioe.ac.uk/>
<http://www.ioe.ac.uk/ssru/>

ISBN: 978-1-911605-13-3

Cover image ©

This document is available in a range of accessible formats including large print.

Please contact the UCL Institute of Education for assistance:
telephone: +44 (0)20 7947 9556 email: info@ioe.ac.uk