



University of
East London

INSTITUTE FOR
CONNECTED COMMUNITIES

**Research on Protection of Minors:
A Literature Review and
Interconnected Frameworks.
Implications for VSP Regulation and Beyond**



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Introduction

Context

The media landscape and associated technology have evolved rapidly over recent years, from live broadcast television, to watching content online, on demand and on different types of digital devices. Globally, children are the fastest growing online audience. In 2018, 40% of the total net new users were children, and one third of all Internet users are children (SuperAwesome, 2019).

According to Ofcom's Children and Parents: Media Use and Attitudes report (2020), in 2019, eight in ten children aged 5-15 (80%) reported watching some form of video on demand (VoD) content, doubling from 44% in 2015. While Ofcom's Online Nation (2020) report found that nearly all children and young people (98%) now use video-sharing platforms (VSPs), which are online services that provide videos to the general public on a commercial basis.

Popular VSPs include YouTube, Facebook, Instagram, Twitter, Snapchat, Imgur, Vimeo, TikTok, and Tumblr. On these platforms, individuals may post self-generated content and media providers can upload TV programmes, films and music videos. This differs from VoD content – such as Amazon Prime Video, Netflix, and BBC iPlayer – as the provider of a VSP does not have control over what videos are uploaded by users.

Net Aware, created jointly by the NSPCC and O2, analyses the most popular apps, games and social media sites used by children. An examination by NSPCC and O2 experts of platforms with an audio video sharing component,¹ revealed that all have an overall safety² rating of average to poor, with all except one posing at least a medium to high risk of harmful content (Net Aware, 2020). Therefore, the most popular apps, games and social media sites used by children fall short of the ideal: an environment designed for the use of children and free from harmful content.³

In acknowledgement of, and to address, the way in which users are changing their viewing habits and to ensure they are adequately protected, as part of its Digital Single Market strategy the European Commission proposed a revised Audiovisual Media Services Directive⁴ (AVMSD) in May 2016. Following extensive consultation, on 6 November 2018, the revised AVMSD (Directive (EU) 2018/1808)⁵ was adopted. The updated Directive extended EU standards on illegal and harmful content to VSPs. Specifically, three categories of harm are considered, the protection of:

- (i) minors from content which may impair their physical, mental or moral development;
- (ii) the general public from content inciting violence or hatred; and

¹ byte, Discord, Facebook, Facetime, Google Hangouts, Google Meet, Houseparty, imo, Messenger, Microsoft Teams, Minecraft, Mixer, PlayerUnknown's Battleground (PUBG) Mobile, Reddit, Skype, Smule, Snapchat, SoundCloud, Steam, Telegram Messenger, Triller, Tumblr, Twitch, Twitter, Viber, WeChat, Whatsapp, YouTube, YouTube Kids, Zoom.

² Overall safety is indexed across 4 measures; 1) Safety Features; 2) Privacy & Location; 3) Reporting & Blocking; and 4) Content.

³ The only exception is YouTube Kids, which has been found to have a lower risk of harmful content (Net Aware, 2020).

⁴ <https://ec.europa.eu/digital-single-market/en/audiovisual-media-services-directive-avmsd>

⁵ <https://eur-lex.europa.eu/eli/dir/2018/1808/oj>

(iii) the general public from content constituting criminal offences (public provocation to commit a terrorist offence, offences concerning child pornography and offences concerning racism and xenophobia).

Given that minors (defined as children and young people under the age of 18 years) are particularly frequent users of VSPs, it is clear why the new Directive specifies that they be particularly protected from content which may *impair their physical, mental or moral development* (the first category of harms, as discussed above). Member States are now required to ensure VSPs that are within their jurisdiction take 'appropriate measures' in respect of videos that are available on their service. VSP providers are also required to comply directly with requirements for advertising they have marketed, sold or arranged themselves.

Research objectives and questions

Ofcom commissioned the Institute for Connected Communities at the University of East London (UEL) to conduct this research in order to help inform VSP guidance. The particular areas of interest identified by Ofcom were:

- Which risks of harm are most prevalent among minors on VSPs (considering both quantitative and qualitative evidence)?
- How do these harms manifest on VSPs?
- Are different VSP characteristics relevant to protecting users from harms?

The UEL research team identified four broad research questions, two main questions to be explored (1 & 2 below), and two subsidiary questions (3 & 4 below) which were beyond Ofcom's area of interest.

It should be noted that the way children and young people use the Internet means that they access a range of different online services. These can include Video Sharing Platforms, social media, messaging apps and gaming sites, among other types of services. As noted later, there is little existing research on the risks of harm on VSPs specifically.

Given this, the report has considered the evidence of the benefits and risks of harm across a range of services. Therefore, the analysis presented reflects children's experience of going online more generally, rather than specifically in their use of VSPs. However, we have highlighted any specific VSP findings where evidence exists. The research questions are as follows:

1. What are the benefits of the Internet for children and young people?
2. What are the risks of harms that may impair minor's physical, mental and moral development?
3. What social solutions exist to address online harms?
4. What safety tech solutions exist to address online harms?

Research design and methods

In order to investigate these areas, a two-strand approach was taken, the first of which was used to inform the second. In Stage 1, a non-exhaustive literature review was conducted in which the most recent and relevant articles in an area were searched for, identified, extracted and analysed. Material was identified through three main methods: (i) academic database searching; (ii) grey literature searching; and (iii) a call for papers.

A total of 186 papers were identified across the four research questions, which were then synthesised and are presented in Chapters 1-4.

In Stage 2, a taxonomy (classification) of the risks of harm was developed. The findings from the literature review informed the conceptual framework. However, a lack of consensus in the literature on risks and harms, the tension between these concepts including issues surrounding correlation and causation, mediating actors, and individual differences, led the Authors to conclude that creating a hierarchy or taxonomy of harms, was neither feasible, useful, practicable or proportionate in trying to create a system of the relative magnitudes of harms.

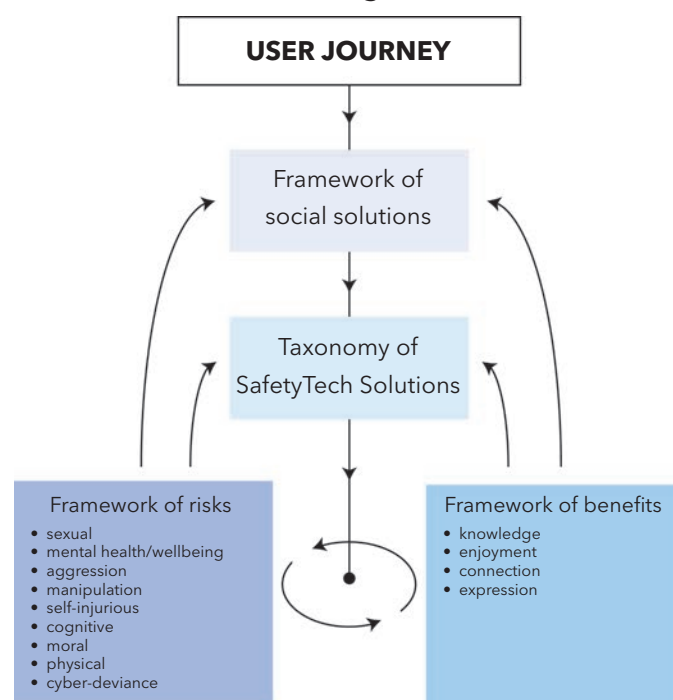
Additionally, risk of harm cannot be considered in isolation: benefits must also be factored in so that attempts to reduce or mitigate negative risk factors do not have an unintended consequence of eliminating positive benefits. Risk of harm must also be considered juxtaposed to solutions which have been conceptualised as social (e.g., education and awareness raising) and technological solutions exemplified in the new UK emerging online safety technology sector, now known as the Safety Tech sector.⁶

Interconnected frameworks: benefits, risks, social & tech solutions

Rather than focusing on a singular taxonomy or framework of risk of harm, which without creating context in terms of benefits and solutions would have little and limited value, the research focused on creating four interconnected frameworks, with a specific focus on a framework of risk. These frameworks are as follows:

- (i) A framework of benefits;
- (ii) A framework of risk;
- (iii) A framework of social solutions; and
- (iv) A taxonomic framework of online safety technologies.

The User Journey: Interconnected Frameworks (Figure 1)



⁶ <https://www.safetynetwork.org.uk/articles/about-the-safety-tech-innovation-network>

The research should be read and considered in the context of the user journey and relationship between the frameworks (Figure 1). The authors suggest that the regulation of VSPs in the UK should perhaps also be considered in the context of factoring in frameworks as detailed in this research study.⁷

In order to address the risk of harms that may impair the physical, mental and moral development of minors, it is necessary to consider how young people navigate technology. This could be characterised as a 'user journey' and use over time which may have developmental implications. Figure 1 maps a prototype of the user journey in terms of the interconnected frameworks which were the subject of this research.

The **framework of social solutions** (see Chapter 3) provides the background context before, at the outset and throughout the user's interaction with technology. It consists of education, awareness programmes and resources for users, parents, schools, and caregivers. This framework should provide early and ongoing education. The Social Solution Directory in Chapter 3 signposts key agencies and organisations providing guidance, educational awareness-raising programmes and information. This provides a useful information resource for VSPs wishing to explore expert advice in key social solution framework areas from trusted sources. The Framework of Social Solutions provides a useful VSP checklist for parents, caregivers, guardians, educators, schools and users. In designing and operating services for minors, VSPs may find it helpful to be aware of the guidance offered to parents by the identified trusted sources as detailed in this review and could share the checklist with users.

As the online user journey continues, the next framework that should be considered is the taxonomic **framework of online safety technology or Safety Tech solutions**. The UK is a world-leader in Safety Tech; some of the UK's most innovative businesses are focused on tackling online harms through a range of technical solutions. The technologies and services work to reduce the risk of users, including children, being exposed to harmful content, contact or conduct such as grooming, bullying, radicalisation and/or viewing self-harm material. They also help to tackle disinformation, and false or misleading narratives. Solutions can be applied at a system level, platform level, endpoint and at the information environment level (see Chapter 4, and Safety Tech taxonomic framework). This taxonomy should help to inform the foundation of any VSP safety strategy by identifying relevant Safety Tech organisations and services. VSPs can build in-house capabilities, or potentially outsource to online safety technology service providers where they lack capacity to meet regulatory requirements.

The **framework of risk and harm** (see Chapter 2) and **framework of benefits** (see Chapter 1) can be considered juxtaposed to each other, given that any user journey can alternate between positive to negative experiences; notably, the same is true in real world contexts. The challenge is therefore to identify risks such as those detailed in the framework, and work towards minimising or mitigating them without impacting benefits to online users. The framework of risk can be used to consider a range of behaviours regarding both perpetrator and user, that could lead to potential risk of harm. These broad behaviours include sexual, manipulation, aggression, self-injurious, cyber deviance (inappropriate or criminal behaviour in a digital context),⁸ mental health/wellbeing, cognitive, physical and moral.

⁷ The Technology Coalition is currently funding research in the area of victim and offender pathways which may shed some light on this issue

⁸ Oakley, Richelle L. and Salam, A. F., "Cyber Citizens and Cyber Deviance: Exploring Social and Technical Factors as Antecedents to Cyber Deviance and the Implications for Cyber Citizenship" (2012). SIGHCI 2012 Proceedings. 7. <https://aisel.aisnet.org/sighci2012/7>

Identification of risk allows for VSP consideration of pre-emptive and protective measures that could minimise risk of harm, and arguably in doing so mitigate actual harm. This review has highlighted access to information, creativity, entertainment, education, self-expression, self-identity, community, ability to experiment, share experiences and build friendships as key benefits of the connectivity afforded by the Internet in general, and platforms such as social media and VSPs specifically (see Chapter 1). In reviewing the literature in this area, benefits have been organised into four broad categories; knowledge, connection, enjoyment and expression.

The proposed ‘framework of risk’ approach could perhaps be considered as a precursor to the regulatory framework of online harms as outlined in the Online Harms White Paper.⁹ The framework of risk as proposed in this report (see Chapter 2) could serve as a useful guide for VSPs to identify risk, consider prevention, stage intervention, action cyber safety solutions and mitigate harm.

The user journey in relation to the frameworks outlined will ultimately need to be considered through the lens of age appropriateness and cyber developmental impact, specifically in the context of VSPs. This will require much more detailed investigation and is therefore beyond the scope of the present research study.

⁹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/944310/Online_Harms_White_Paper_Full_Government_Response_to_the_consultation_CP_354_CCS001_CCS1220695430-001__V2.pdf

Summary of Research Findings

Benefits

The literature review found numerous benefits and positives associated with children and young people using the Internet generally, and social media and VSPs specifically. In summary, it was found that:

- While social media/VSPs determine 13 as the minimum age to access their services, many children aged 8 or younger regularly use them;
- Broad benefits of using VSPs include: knowledge, connection, enjoyment and expression, with specific benefits being as follows:
- VSPs may provide access to information and aid learning, education and school work; Research finds that VSP tutorials and 'how to' videos are particularly useful for learning; VSPs can be fun, entertaining, and creative;
- Unlike some social media, VSPs don't usually involve passive scrolling, but encourage children to be creative by making and uploading their own videos;
- Children may also use VSPs to have fun/cheer themselves up, by watching funny/silly videos;
- VSPs may provide a space for self-expression and the development of self-identity;
- Such platforms allow children and young people to be who they really are and find other individuals and groups who are similar/like-minded;
- Platforms also provide a space for children and young people to have a 'voice' on, for example, political issues, that they may not have had before;
- Online campaigning and activism by young people are also facilitated by VSPs;
- VSPs are key in helping children and young people stay connected with friends and family;
- Such platforms may nourish and maintain existing friendships/relationships, and help children develop new friendships;
- VSPs may foster the building of social capital and can thus reduce isolation and loneliness;
- VSPs provide a platform for children to share their feelings and derive emotional support, encouraging open and honest dialogue;
- VSPs foster a sense of belonging and community, which may be particularly important for vulnerable, isolated and/or minority groups;
- Such groups may include LGBTQ+ young people, those with physical disabilities, mental health issues, those who have questions surrounding their sexual orientation or gender identity, or those who are socially/physically isolated;
- VSPs help young people to access health information, connect with others their age about health issues and share experiences;
- Such platforms also enable children and young people to access health support via apps, support groups, and professionals;
- During the coronavirus pandemic young people have used VSPs to help them stay connected with friends and family, do schoolwork, find information, have fun, keep busy and be entertained.

Risks and harms

However, while there are numerous benefits associated with children using the Internet generally, and VSPs specifically, there are also well documented risks¹⁰ (sometimes referred to as 'concerns' in the literature) and harms (sometimes referred to as 'negative/adverse experiences' in the literature). In summary, it was found that:

- There are various potential risks and harms to children and young people being online, using social media and VSPs;
- However risks may, but do not necessarily, lead to harms;
- There are many confounding/mediating factors that mean that one child may be harmed and another not;
- Mediating factors include: age, gender, sexual orientation, baseline mental health, psychological vulnerability, social isolation/connectedness, amount of time spent on devices/online, and platforms/sites;
- Age is a crucial factor, with research finding that children are more likely to be harmed online than adults;
- Children will differ in their responses to online content, and the likelihood of them being harmed, across different developmental stages;
- There are issues surrounding establishing causation, with most research only showing correlations and associations between VSP use and a particular risk/harm;
- Most research in the area is cross-sectional, with more longitudinal research needed to provide evidence of causality;
- Broad risk categories of using VSPs include sexual, aggression, manipulation, self-injurious, cyber deviance, mental health/wellbeing, cognitive, moral and physical;
- Sexual risks include exposure to pornography, sexting, naked selfies/nudes, grooming, child sexual abuse, child sexual exploitation/coercion, child sexual abuse material, livestreaming of child sexual activity/abuse, meeting online strangers in real life;
- Aggression includes exposure to hate speech, violence, incitement to violence, extreme content, cyberbullying, online harassment, cyberstalking;
- Manipulation includes image/video filtering, editing and photoshopping, fake profiles, fake news, mis/disinformation, deep fakes, radicalisation, advertising and profiling, AI and algorithmic manipulation, persuasive design nudging and targeting;
- Self-injurious includes exposure to self-harm, eating disorders, suicide content, alcohol and tobacco;
- Cyber deviance¹¹ includes identity theft, hacking, cyberscams/cyberfraud, malware/spyware;
- Mental health includes psychological distress, depression, anxiety, loneliness, isolation, social withdrawal, low self-esteem and inadequacy, FOMO, addictive type behaviours, problematic Internet use, gaming disorder;
- Cognitive includes attention, memory, executive function, brain structure/functioning;
- Moral includes judgement, decision-making, character traits, values;
- Physical includes sleep deprivation, obesity, tech ergonomic risk;

¹⁰ Used in the literature to broadly mean anything that might be potentially worrying, troubling or disturbing to children.

¹¹ Cyber deviance refers to inappropriate or criminal behaviour in a digital context "Some may prefer to define cybercrime as deviant behaviour. Doing so results in a broader sociological perspective. The distinction between defining cybercrime as deviance rather than as criminal behaviour is that the focus shifts to societal norms rather than legally proscribed rules" pp.17-18 (Payne 2020)

- Unique features of VSPs may enhance or facilitate such risks: e.g., they are hard to moderate, impulsive, don't allow for editing, and facilitate inadvertent viewing of harmful behaviour.

Social solutions

The literature reviewed found that many organisations provide Internet safety awareness advice, in addition to VSP specific advice, for parents and teachers. This section, described as 'social solutions', outlines the key advice from trusted sources. In summary, it was found that:

- In recent years there have been calls to include digital literacy, digital resilience and online harms in Personal, Social, Health and Economic (PSHE) education, which it has been argued should be made mandatory;
- In 2020 new statutory guidance from the DfE announced that Relationships Education (RE) / Relationships and Sex Education (RSE) would become mandatory in all schools and encompass teaching about online harms;
- While seen as necessary and important, PSHE is still not mandatory in state schools;
- Such education is often under-resourced, lacks teachers with specialist training, and has no centralised resource for teachers;
- External organisations often come into schools to teach digital literacy and e-safety, which can lead to a fragmented and disjointed approach;
- External organisations recommended by the DfE include the PSHE Association, NCA-CEOP, Childnet, and UKCIS;
- General advice includes that on how to: keep personal information safe, report worrying content, communicate with strangers, think critically, use safety tools, and seek help;
- Parental guidance is also crucial to help children stay safe online, however parents are often lacking in the skills needed to do this;
- The DfE recommends parental guidance from the NSPCC, Internet Matters, Parent Info, Parent Zone, UKCIS, and the UK CMO;
- Parents, schools and industry have a considerable role in supporting children's digital literacy. However, parents are often not equipped with the skills to be able to support children in this and schools are lacking in the resources to adequately deliver digital literacy as part of the curriculum;
- Most parental advice focuses on the use of the Internet/social media generally, starting with the principle that mentorship is better than surveillance.

Safety Tech solutions

The literature reviewed in this section found that there are numerous safety issues with VSPs that may be addressed through online safety technology or 'Safety Tech'¹² solutions. In summary, it was found that:

- VSPs will be required to ensure that appropriate measures are in place to protect users from harmful content;

¹² Safer technology, safer users: The UK as a world-leader in Safety Tech <https://www.gov.uk/government/publications/safer-technology-safer-users-the-uk-as-a-world-leader-in-safety-tech>

- Solutions to the identified challenges in relation to the 10 measures proposed by the AVMSD are complex, require further systematic research and are not easily resolved;
- Advertising is a fundamental factor influencing platform design/policy decisions, as social media/Internet platforms are economically motivated to increase site activity to increase advertising revenue. This is achieved by collecting data from users, which is either used to better target advertising or sold to customers and data brokers. As digital platforms are powerful persuasive tools, best practice/regulation protocols are of the utmost importance;
- Age verification continues to be problematic; reasons for the age of digital consent being set at a particular age are unclear and age restrictions are easily circumvented;
- There is a paucity of robust research that could inform age related thresholds/recommendations regarding general online media and specifically VSPs;
- The UK is currently a world leader in the area of online safety technologies, in order to address online harms. VSPs may consider the emerging Safety Tech sector as an important resource in terms of assisting and augmenting their product and performance.

Methodology

Literature reviews

A *non-exhaustive literature review* was conducted, to consider two main research questions (1 & 2 below) and two subsidiary research questions (3 & 4 below):

1. What are the benefits of the Internet for children and young people?
2. What are the risks of harms that may impair minors' physical, mental and moral development?
3. What social solutions exist to address online harms?
4. What safety tech solutions exist to address online harms?

Search terms were developed from the research questions and, from the search terms, four search strings were then generated (see Appendix A for detailed methodology). Studies were included that were: published between 2015-2020; from North America, the UK, and Europe; English language publications; and using all research methods. The relevant literature was identified through three main methods:

- systematic searches for relevant literature on academic database PsycInfo;
- an online search for grey literature (e.g., from government bodies, charities, NGOs, independent consultancies, and industry) using the Google search engine; and
- a call for papers, disseminated via social media, with a view to identifying the most up to date key papers in the area, in addition to seminal literature.

The databases allow ordering of results by relevance, and only the first 50 results were reviewed from each database, for each search, given the tight timeframe of the project. Table 1 below breaks down the number of papers identified by each search string.

Table 1: Breakdown of number of papers by search string

Search string	Research question	Number of papers
1	Benefits	40
2	Risks/Harms	100
3	Social solutions	17
4	Safety Tech	29
Total		186

Frameworks

The literature review was then used in order to develop four interdependent frameworks. An inductive/bottom-up/data-driven approach – as opposed to a deductive/top-down/theoretical approach – was taken in order to do this. Four frameworks emerged from the literature review:

- (i) a framework of benefits;
- (ii) a framework of risk of harm;
- (iii) a framework of social solutions; and
- (iv) a taxonomic framework of safety tech solutions.

Chapter 1. Online benefits

1.1 Introduction

This literature review found that there may be numerous benefits to children and young people using VSPs. However, before looking at the benefits of VSPs, it should be established what age ranges are considered in this research. For the purposes of this research a child is defined as any person under the age of 18. However, it is the age of 13 specifically that is a crucial benchmark in relation to technology use. The Children's Online Privacy Protection Act (COPPA) in the US sets 13 as the age at which services can collect personal information without parental permission. Therefore, in line with this, nearly all social media platforms set the minimum age restriction to 13¹³ (UK Safer Internet Centre, 2018a). The UK has also adopted 13 as the age of digital consent¹⁴ (UK Safer Internet Centre, 2018b; Blum-Ross, et al., 2018). Thirteen to 18 is therefore the age group most heavily researched with respect to online benefits, risks and harms. However, the reasoning behind setting this benchmark at 13 is unclear and the appropriateness of 13 continues to be debated (Blum-Ross, et al., 2018; Cooney, 2019).

In addition, although 13 is the minimum age for using most social media sites, a significant proportion of under 13s do so. Ofcom's children's media use and attitudes report (2019), for example, found that a significant proportion of primary school-age children have their own social media profile. Specifically:

- a quarter of 10-year-olds who go online claim to have a profile, with this proportion almost doubling to 43% of 11-year-olds;
- a minority of parents of pre-schoolers (1% of 3- 4s) and younger school children (4% of 5-7s) also say their child has a profile;
- by the age of 13 (the minimum age restriction on most social media platforms) more than half have a profile; and
- by the age of 15, almost all have one.

Furthermore, it was found that only a minority of parents (between two and three in ten) whose child had a social media profile knew the minimum age for Facebook, Instagram and Snapchat. Moreover, many parents agreed that they would let their children use social media sites before they had reached the minimum age (23% of parents of 8-11s who go online, rising to 36% of parents of 12-15s who go online). More specifically, Ofcom found that, in the under 13s age group:

- 12% of 9-year-olds have a social media profile;
- 24% of 10-year-olds have a social media profile; and
- 43% of 11-year-olds have a social media profile.

The majority, although not all (see below), of the literature reviewed in the following chapters concentrates on older children (aged 6/7/8 and above) rather than infants and pre-school children.

¹³ With the exception of Whatsapp.

¹⁴ Originally in agreement with COPPA now compliant with GDPR, but lower than the recommended threshold of 16.

However, it should briefly be noted that very young children are increasingly spending a significant amount of time online. For example, research conducted in 2018 in the UK by Childwise found that 75% of 3-4 year olds had access to an Internet connected device, spending on average 2hrs 48m online and that VSP content (namely YouTube) was the most popular app (BBC, 2018). Furthermore, the introduction of touchscreen devices in 2007 – giving rise to a generation of ‘Digitots’ – has resulted in more infants being online than ever before. In the age range of 18 months – 3 years, almost 50% watch online content every day (viewing platforms such as YouTube or Netflix), meaning this generation is more likely to learn how to go online before they learn how to walk (Elias & Sulkin, 2017). Yet children of this age group rarely have an understanding of what it means to be ‘online’ or even a concept of the Internet (Edwards, et al., 2016). Arguably, there is a reasonable expectation of parental supervision for this very young age group; however not all parents are aware of best practice regarding screen time. Therefore, there is a need to consider how parents and caregivers can be informed and educated in this regard. While out of scope for this piece of work, this should be considered as an important area for future research.

The literature reviewed in this section found that children and young people may derive numerous benefits from using the Internet, social media, and VSPs specifically. In their recent report on technology use and the mental health of children and young people, the Royal College of Psychiatrists (RCPsych, 2020) concluded that *“the internet can be a rich and valuable resource for young people”* (p.24). While Ofcom’s children and parent’s media use and attitudes report (2020),¹⁵ found that parents of children and young people aged 5-15 who go online, and the children themselves, said that the Internet benefited them in various ways. Specifically:

- 77% said it helped with their schoolwork or homework;
- 59% said it helped to develop creative skills;
- 34% said it helped to build or maintain friendships;
- 65% said it helped them learn a new skill;
- 42% found it useful to share issues they may have; and
- 22% said it helped them to understand what others are thinking/feeling.

Over half of parents agreed that the benefits of the Internet outweighed the risks although, in terms of trends, notably the percentage thinking this is decreasing (from 65% in 2015 to 55% in 2019). More specifically, three quarters of parents of 5-15s agreed that the Internet helped their child with their schoolwork or homework, and approximately six in ten felt that their child learnt new skills. Looking at social media, children with a social media profile were more likely overall to feel positive than negative:

- around nine in ten children (aged 8-15) said that it made them feel happy or closer to their friends;
- nearly seven in ten children aged 12-15 (67%) said they used it as a form of support, having sent supportive messages, comments or posts to friends who were having a hard time;
- nearly two in ten children aged 12-15 (18%) had supported causes or organisations by sharing or commenting on posts; and
- one in ten (9%) had signed petitions on social media.

¹⁵ The report looks at media use, attitudes and understanding among children and young people aged 5-15, as well as about the media access and use of young children aged 3-4. It also includes findings on parents’ views about their children’s media use, and how they monitor and limit it.

Benefits derived may vary according to, and be mediated by, various factors, situations, and circumstances. These may include gender, age, sexual orientation, family circumstances, social isolation/connection, baseline mental health, time spent online, and platform used. Any such factors identified in the literature will be highlighted below. However, it should be noted that we know less about the demographics of children that gain the most benefit out of their experiences than those who are potentially harmed by them (as explored in the next chapter). There is thus a need for more longitudinal research on the benefits of children's use of the online environment. It should further be noted that there are issues surrounding causation and correlation, with most studies being cross-sectional rather than longitudinal, meaning that in many cases we can only posit an association between using the Internet/VSPs and any given specific benefit.

1.2 Information, education, and learning

Social media may broadly help young people to access information and aid learning, providing “many educational opportunities” (RCPsych, 2020, p.24). A survey of over 3,000 pupils aged 6-19 by The House of Commons Science and Technology Committee (2019), which “set out to investigate whether the growing use of social media, and screens, among children is healthy or harmful” (p.6), found that children may share information and swap revision tips via social media. In written evidence, the Department for Digital, Culture, Media and Sport (DCMS) cite the potential for social media to help young people collaborate on school projects, and the Bristol Safeguarding Children’s Board told how A-Level students used social media to quickly xchange “*revision tips and resources*” (p.20).

The inquiry also found that VSPs such as YouTube, which has video tutorials, can have an important role in helping some young people learn and develop skills. This is supported by Ofcom’s Online Nation (2020) report which says that VSPs are mainly used to “*watch how-to videos*” (p.118). The All Party Parliamentary Group (APPG, 2019) on Social Media and Young People’s Mental Health and Wellbeing similarly found that VSPs/social media can be a useful source of information for young people to develop new skills through tutorial videos or discussion forums about school work. Indeed, research has found that YouTube is now young people’s preferred method of learning. A survey of 2,587 14-40-year-olds in the US (The Harris Poll, 2018) looked at differences in the Generation Z group (aged 23 and under) and Millennials (aged 24-40) in their use of technology and learning preferences. Six in ten (59%) of the Generation Z group ranked YouTube as their preferred learning tool (versus 57% for in-person group activities, 47% for learning apps or games, and 47% for printed books). While Millennials preferred books to YouTube (60% versus 55% respectively).

Research suggests that learning facilitated by VSPs has increased during the recent coronavirus pandemic. Looking at the Internet as a tool for finding information, research by Audley Villages (2020) that analysed Google Trends data, found that global searches for ‘things to do’ increased by 4,300% during lockdown, with people using social media and VSPs to learn new skills and occupy themselves. For example, social media challenges increased in popularity, while searching for exercise (e.g. boxing, pilates, yoga, running and Zumba) and for new skills (e.g. learning an instrument, meditation, photography, origami, and painting) also scored highly.

In response to such findings, in June 2020 TikTok announced plans to commission hundreds of experts and institutions – including universities and charities – to produce educational content for the VSP, appealing to the trend for ‘micro-learning’. Rich Waterworth, TikTok's general manager for Europe (cited in Iqbal, 2020), said the VSP had noticed that users were increasingly interested in educational videos, as evidenced by over seven billion views of the hashtag #LearnOnTikTok.

1.3 Entertainment, fun, and creativity

The Internet can also provide a means for some children to have fun and be entertained, as highlighted by an NSPCC (2017) survey of 1,696 11–18-year-olds in the UK, which found that the majority of young people are motivated to go online for enjoyment and fun. This is supported by research by Parent Zone (Rosen, 2016) into young people's social media use and mental health, which found that three quarters of children said the Internet has made them feel happy, and two thirds said it has made them feel relaxed.

More specifically, The Children's Commissioner (2018) found that *“children knew how to cheer themselves up or calm themselves down using social media, from getting funny Snapchats from a friend to watching slime videos on Instagram”* (p.4). As one child said: *“If you're in a bad mood at home you go on social media and you laugh and then you feel better”* (Kam, 10, Year 6). Younger children particularly may use VSPs to have fun, as they are less concerned with their appearance in videos and more concerned with the content. This may be because they use VSPs such as Musical.ly (now TikTok) and Roblox more frequently than older children, *“which are more focused on what you do in videos and games than how you look, compared to primarily photo-based apps such as Instagram”* (p.25).

Social media can also be a medium for some children to be creative. The House of Commons (2019) inquiry found that social media can both encourage young people to be creative and also to share their creations (e.g., blogs, vlogs and podcasts). This may be positive and empowering, can improve mental health and confidence, and help young people support their peers. Orlando (2020) observes that the VSP TikTok in particular can be more creative than other social media as it encourages young people to plan and create their own content, using the technology *“purposefully and with meaning”*.

While a survey of 2,000 parents by Internet Matters & Huawei (2018) found that some parents viewed their children creating vlogs and livestreams akin to *“an extension of play”* (p.13). Parents cited their children, for example, pretending to be film stars, TV characters, celebrities, or vloggers. Parents saw this as positive behaviour as it helped their children become familiar with fast changing technology; provided a creative outlet for them to express themselves and demonstrate their skills; helped to foster their confidence, independence and self-worth; and provided a sense of achievement.

1.4 Self-expression and self-identity

Relatedly, children may also express themselves more freely online, which can help contribute to developing their self-identity. In written evidence to the APPG (2019), Young National Children's Bureau (NCB) members said that social media allowed them to express themselves, and The Children's Commissioner (2018) found that younger children (aged 8–12) used social media to begin expressing themselves away from parents and teachers, as it provides a platform to be creative and experiment.

A survey by the Royal Society for Public Health (RSPH, 2017), which solicited the views of 1,479 young people (aged 14 to 24) about five social media platforms/VSPs (Facebook, Instagram, Snapchat, Twitter and YouTube), also found that social media can provide a platform for both self-expression and self-identity. They observe that the expression of self-identity is particularly important throughout teenage years as young people experiment and try new things before developing an evolved sense of self. Social media allows for this means of expression, as young people *“personalise their profiles and feeds with images, videos and words that express who they are and how they identify with the world around them”* (p.14). They can also share creative content, interests, and follow/like individuals/groups/pages which show the world who they are. Of the five platforms considered, the VSP YouTube scored most highly for measures of self-expression, awareness, and self-identity.

A report commissioned by Barnardo's (Papamichail & Sharma, 2019) also found that social media may allow young people to discuss issues – e.g., social, political, and sexual – within safe and welcoming groups, allowing them to ‘be themselves’ in ways in which they can’t be offline. Barnardo's practitioners also said that young people could express themselves more freely on social media, and services likewise cited self-expression as a positive effect, particularly for those aged 16-19. More specifically, the RSPH (2017) found that social media has revolutionised how young people express political views, and evidence submitted to the House of Commons (2019) inquiry from Girlguiding quoted one of its advocates, ‘Katie’, who said: *“The internet gives young people a voice [...] gives us access to political discourse and has made us one of the most connected and worldly generations of all time—and the value of this cannot be overlooked”* (p.18).

An extension of this is online campaigning and/or activism, where young people may use the Internet to engage with, or advocate for, a specific cause. For example, research by Stonewall and Childnet (2020) found that some LGBT young people may campaign against anti-LGBT discrimination as a way of “expressing their identity online and building an offline world where they feel represented, safe and free” (p.15). While Ofcom's Media use and attitudes report (2020) found evidence for growing online activism among young people in 2019, dubbed the ‘Greta effect’, with an increase in the percentage of 12-15s using social media to support causes/organisations by sharing/commenting on posts (18% in 2019 vs. 12% in 2018) and one in ten having signed petitions on social media in the past year. Taking part in such online campaigning and activism are considered to be important in helping young people to establish their identity online and to express themselves.

1.5 Friendships, relationships and staying connected

Connection, friendship, and relationship formation and maintenance are often found to be one of the most beneficial outcomes of using social media, with the RCPsych (2020) report finding that *“the majority of teens report that social media can help them to develop and sustain friendships”* (p.24). Social media may facilitate children staying in touch with friends and family worldwide, socialising online with current friends, getting in touch with old friends, and meeting new friends, which can also enhance real world interaction (RSPH, 2017; APPG, 2019). Similarly, the House of Commons (2019) survey of over 3,000 pupils found that “following friends’ updates” was the main reason respondents used social media.

Supporting this, written evidence jointly submitted to the inquiry by YoungMinds and the Children's Society, based on research with 1,000 young people aged 11-25 years, found that 62% of children said that social media had a positive impact on their relationships with friends. Furthermore, a UNICEF literature review of 20 studies found that the evidence *"suggests mostly positive outcomes from using digital technology in terms of children's social relationships"* (p.7). Finally, The Children's Commissioner (2018) found that social media was important in pre-teens for maintaining relationships, helping children to 'stay in the loop' socially, and judge the strength of their relationships.

Looking at VSPs more specifically, a survey by Internet Matters & Huawei (2018) about livestreaming and vlogging found that livestream video – which is instant, time efficient, and easy to share – may be a novel way for some children to communicate with each another and update multiple friends at the same time: *"If a picture says a thousand words then a video says a million"* (p.14). It was further found that children can showcase their talents and stay connected with their friends and peers – whether it is by sharing their creations within Minecraft or singing using Facebook livestreaming – and have their confidence boosted when they receive positive comments.

During the coronavirus pandemic, social media became an invaluable means of helping to keep some children and young people virtually connected with their friends and family. Bessant et al. (2020) note that children have had virtual play dates, and family gatherings have been hosted online via apps such as FaceTime and Skype. Ofcom's Life in Lockdown (2020) report, based on 14 interviews with young people, found that children socialised online more during lockdown. Online activities to stay connected included regular check-ins on various apps, and using platforms such as Zoom, Skype, FaceTime and Snapchat to talk to friends. Finally, Ofcom's Online Nation (2020) report found, in respect of VSPs specifically, that *"during the coronavirus pandemic, livestreaming has provided a means for users to stay in touch and boost morale"* (p.129). For example, Instagram introduced a 'shared story' to help those who were social distancing to connect with others, using a 'Stay Home' sticker. While TikTok introduced an #IsolationGames challenge, which connects users with Team GB athletes.

1.6 Building social capital and reducing loneliness

Relatedly, a growing body of research has argued that the social connections that young people form on social media can provide an opportunity for them to develop social capital, which is built when social media is used to create and maintain connections and relationships between people and thus reduce loneliness, as users actively communicate with others (The Centre for Mental Health, 2018).

A series of studies by Jean Twenge and colleagues (e.g., Twenge, Spitzberg & Campbell, 2019), found evidence to support the idea that greater social media use among individuals – particularly socially and technologically competent ones – can generate more social capital and opportunities for in-person interaction. Kardefelt-Winther's (2017) literature review found that those with less social capital may use digital technology to compensate for this and build positive relationships. The APPG (2019) report also found that online connections can help to reduce isolation and loneliness. For example, evidence submitted by Samaritans' stated that social media can have a protective effect on young people's emotional wellbeing: *"It was clear ... that the online environment can be hugely important for reducing social isolation"* (p.15).

Furthermore, a report commissioned by TalkTalk (2019) – which looked at the causes of loneliness among 13-16-year-olds and the role of technology – also found that *“used in the right way, technology can be a solution to loneliness and an important way of staying connected to their peers”* (p.16). This is supported by Barnardo’s (Papamichail & Sharma, 2019), who found that social media is frequently used by young people to maintain and create connections, through which they can expand their social capital, reducing loneliness and isolation. This view was echoed by Barnardo’s practitioners, who reported that social media can be a support for young people, particularly those who are socially and/or physically isolated.

The social connectedness provided by social media may also have other mental health and wellbeing benefits. For example, in their systematic review of studies that looked at depression and anxiety in the context of social networking, Seabrook et al. (2016) found that positive interactions, social support, and social connectedness on Social Networking Sites (SNSs) were consistently related to lower levels of depression and anxiety. They also found that SNS use was related to less loneliness, greater self-esteem and life satisfaction. Similarly, the Centre for Mental Health (2018) found that social media may help to boost self-esteem, when young people present a positive version of themselves to their networks. However, they note that there are questions surrounding the sustainability of these benefits over time and addictive-like behaviours. Some research has also found that social media/VSPs may increase loneliness and cause, or worsen, mental health problems; these issues are explored further in the risks and harms chapter.

1.7 Emotional support and belonging

There is also evidence that some young people may derive emotional support, a sense of belonging, and of being part of a community from social media. For example, evidence given to the APPG (2019) as well as research by Barnardo’s (Papamichail & Sharma, 2019), found that children can receive support from friends online when using social media. Expanding on this, the House of Commons (2019) inquiry found that social media may help young people to be more open and honest with friends, as well as create a safe (and perhaps anonymous) space for them to express their worries and get support in challenging times.

In evidence submitted to the inquiry by Professor Przybylski and colleagues, based on research conducted with 1,060 teenagers in the US, 68% said they had *“received social support by using [social media] technologies in tough or challenging times”* (p.18). The RSPH (2017) survey similarly found that nearly seven in ten young people reported turning to social media for support in challenging times and/or when experiencing mental health problems, by sharing issues with friends and wider networks. Facebook users, as opposed to general Internet users, were more likely to report higher levels of emotional support, which suggests that social media may provide particular support.

Support may also differ by developmental stage. For example, the Children’s Commissioner (2018) found that older children (aged 8-12) tended to use social media as a source of emotional support from online friends more than younger ones. While Best et al. (2016) found that online support may be particularly positive for the wellbeing of older teenage boys. In a survey of 527 adolescent males (aged 14-16) it was found that those who reported speaking to online friends about personal problems had statistically significantly higher levels of mental wellbeing (Best et al., 2016, p.257).

Written evidence to the House of Commons (2019) inquiry by YoungMinds and the Children's Society highlighted how social media use in young people can promote a sense of belonging and community. Particularly when facing trauma, challenging life events or poor mental health, children may share their experiences or look for information and advice on social media among those who are facing similar issues. This may be useful for children who are isolated due, for example, to disabilities, communication issues, mental health problems, or for those who are struggling with aspects of their identity such as gender and sexuality.

Similarly, the RSPH (2017) survey found that community building through social media – where young people can join 'groups' or 'pages' with like-minded/similar people – can be a specific benefit, giving young people a sense of belonging. This may particularly apply to minority groups, such as LGBTQ+ young people or those from ethnic minorities, who may feel isolated in the real world. Supporting this, Stonewall and Childnet (2020) found that for LGBT children and young people the Internet may be *"a sanctuary where they feel free to be themselves; and a place where they can meet like-minded individuals or feel part of a worldwide community"* (p.12), with 93% saying it had helped them find advice/support about their sexual orientation and gender identity.

This is supported by the APPG (2019) inquiry in written evidence from Internet Matters, who stated that technology can be *"especially important for children who fail to find their tribe at school and/or have special interests or special needs"* (p.14). Looking at VSPs specifically, Orlando (2020) found that TikTok particularly *"celebrated diversity and inclusivity,"* providing a sense of belonging to a specific group, including for those with special interests/experiences, or from specific social groups or religions.

1.8 Health advice, information, and support

Linked to deriving support in a broad sense, there is evidence that young people may specifically access (mental and physical) health information and support online. Best et al.'s (2016) survey of 527 teenage boys found that 42% used the Internet to retrieve health information, with 57% using search engines to do this and 48% using social media. While a survey of 1,346 young people in the UK (Goodyear et al., 2018) which looked at the role of social media in influencing young people's health and wellbeing, found that:

- 46% reported changing their health-related behaviours as a direct result of accessing content from social media;
- 43% said that health-related content on social media positively affected their health;
- 53% used social media to access health information on food intake, sleep, exercise or body image from SnapChat, Instagram and YouTube; and
- 63% believed that social media was a good source of health information.

Content accessed, created and shared included: (i) peer content (e.g., selfies); (ii) suggested or recommended content (e.g., on YouTube); (iii) automatically sourced content (e.g., commercial content promoted on Instagram); and (iv) content from reputable accounts (e.g. celebrities, government, official organisations). The authors observe that *"social media offers exceptional opportunities to inform young people's learning about health, and to have a range of impacts on their health and wellbeing behaviours"* (p.4).

The RSPH (2017) survey (N=1,479) found that some young people may find accessing mental health content from their peers particularly helpful, as it gives them the chance to *“read, watch or listen to, and understand, the health experiences of others - relating them back to their own reality”* (p.13). The sharing of first-person experiences on blogs or vlogs can improve users’ health literacy; facilitate access to useful services; enable better healthcare choices; and offer coping mechanisms. As one participant said: *“I have anxiety and, on many occasions, I have found videos that put how I feel into words and explain it, and this benefits me a lot making me feel more confident”* (p.13).

The Centre for Mental Health (2018) also found that young people may derive benefits from making connections with those with similar/shared lived experience, getting support and empathy, which they may find hard to access in the real world (e.g. due to social anxiety). The APPG (2019) inquiry heard evidence that social media may support recovery from mental illness. For example, written evidence from Facebook cited a range of Instagram accounts *“dedicated to specific mental health issues, as well as hashtags such as #edrecovery and #bodypositive, which are used by our community to connect with one another, document their recovery, and offer encouragement and support for others going through similar experiences”* (p.16).

The Centre for Mental Health (2018) also found that social media can facilitate mental health ‘learning’, e.g., by facilitating information seeking and providing opportunities for self-referral to services. Some social media sites/VSPs actively support users’ wellbeing. For example, Facebook has helped users to find support groups, has crisis management services via Messenger, and suicide prevention tools.¹⁶

During the coronavirus pandemic, TikTok and Snapchat have both been harnessed for good. Ofcom’s Online Nation (2020) report notes that during lockdown TikTok partnered with the World Health Organisation (WHO) *“to host live streams that featured WHO experts answering live questions about health information”* (p.120). Snapchat also partnered with WHO, launching a filter promoting safety tips and guidelines. While Orlando (2020) found where there have been billions of views of videos with coronavirus hashtags on TikTok for example #quarantine (65bn), #happyathome (19.5bn), and #safehands (5.4bn) which include young people singing and dancing. WHO also posted its own videos on the VSP to give young people reliable public health advice about COVID-19. Orlando says: *“The key benefit is the platform became a place where young people joined together from all corners of the planet, to understand and take the stressful edge off the pandemic for themselves and others their age. Where else could they do that?”*

¹⁶ In September 2020, Facebook announced that it would no longer show health groups in its recommendations, as it was vital that health information was derived from “authoritative sources” (Culliford & Rana, 2020). The move was prompted by an estimated 3.8 billion views of misleading health content over the past year, peaking during lockdown.

1.9 Framework of benefits

Table 2: Framework of Benefits

Broad category of benefit	Specific benefits
Knowledge	➤ Information ➤ Education ➤ Learning ➤ Health advice/support
Connection	➤ Friendships/relationships ➤ Staying connected ➤ Building social capital ➤ Reducing loneliness ➤ Emotional support/belonging
Enjoyment	➤ Entertainment ➤ Fun ➤ Exploration ➤ Play
Expression	➤ Creativity ➤ Self-expression ➤ Self-identity

1.10 Conclusion

In conclusion, children and young people may derive many benefits from new digital technologies. Access to information, creativity, entertainment, education, self-expression, self-identity, community, ability to experiment, share experiences and build friendships are just some of the advantages of the connectivity afforded by the Internet in general, and platforms such as social media and VSP's specifically. In reviewing the literature in this area, and as illustrated in Table 2 above, we have organised benefits into four broad categories – (i) knowledge, (ii) connection, (iii) enjoyment, and (iv) expression – with various sub-categories in each, in order to create a framework of benefits. However, balance is essential, and while benefits are very important, they must also be considered through the lens of risk and harm, which will be discussed in Chapter 2.

Chapter 2. Online risks and harms

2.1 Introduction

As discussed in Chapter 1 there are numerous benefits associated with children using the Internet generally, and social media and VSPs specifically. However, there are also well documented risks and harms in doing so, which will be explored in this chapter. Before looking in some detail at the risks and harms that may be associated with using VSPs and other online platforms, there are several critical issues to briefly consider first.

Firstly, it is important to be clear that risks (concerns) may be, but are not necessarily, associated with harms (negative/adverse experiences) (House of Commons, 2019). As Livingstone et al. (2017) say: *"Risks do not inevitably result in harm, but rather concern factors that raise the probability of harm to children"* (p.20). Supporting evidence for this can be found in the EU kids online report, which surveyed children and young people from 19 different countries, finding that the proportion of children who said that something online had 'bothered or upset' them (actual harm),¹⁷ was smaller than the proportion who reported the more common risks, suggesting *"that not all risk results in self-reported harm to a child"* (Smahel et al., 2020, p.7). It is thus stressed that *"risk is the potential for something to happen. Sometimes risk experiences result in harm, but risk and harm must be differentiated"* (p.44).

Secondly, it should be noted that the association between risks and harms will also be mediated by various factors, circumstances and situations. As Smahel et al. (2020) say: *"The same activity can have positive consequences for one child and negative consequences for another"* (p.43). Or as Rosen (2016), in a survey of 220 young people (aged 13-20), found: *"The young people we spoke to strongly agreed that the online world affects people differently depending on factors like their mood and their age - what one person might be able to brush off without much worry, others might find deeply disturbing"* (p.1).

However, this literature review highlighted how there is a lack of research into the specific variables that may make one child more vulnerable than another. For example, the House of Commons (2019) inquiry expressed surprise at the lack of *"published research on exactly who was at risk and if some groups were potentially more vulnerable than others when using screens and social media,"* recommending that the Government *"as a matter of urgency ... should commission research to identify who is at risk of experiencing harm online and on social media, and why, and the longer-term consequences of that exposure on children"* (p.3).

This is expanded upon by the Royal College of Psychiatrists (2020) who found that there is a complex non-linear relationship between the use of technology - including social media and VSPs - and mental health and wellbeing. This relationship depends on various factors both in individual children and young people, in addition to the different forms of technology and how they are used. Such factors may include age, gender, sexual orientation, baseline mental health, psychological vulnerability, social isolation/connectedness, amount of time spent on devices/online, and platforms/sites used.

¹⁷ Respondents were asked: "In the PAST YEAR, has anything EVER happened online that bothered or upset you in some way (e.g., made you feel upset, uncomfortable, scared or that you shouldn't have seen it)?"

This literature review suggests that the variable of age in particular is a crucial factor, and VSPs should understand that children may be more likely to experience harm than adults. As observed by Ofcom (2020): *"Children aged 12-15 are more likely than adults to say they have experienced potential harms related to content and interaction"* (p.30). Furthermore, children and young people at different developmental stages will have different vulnerabilities in both the real world and cyber contexts.

The difference in cyber development across childhood age-bands is acknowledged in official guidelines aimed at those who work with children. For example, the UK Council for Internet Safety (UKCIS) Education Working Group (2020) developed a framework – Education for a Connected World¹⁸ – that considers the skills and understanding that children and young people should have at different developmental stages, in relation to: self-image and identity, online relationships, online reputation, online bullying, managing online information, health, wellbeing and lifestyle, privacy and security, and copyright and ownership. The framework describes the understanding and skills that children should have related to these eight strands, at different ages, specifically: 4-7; 7-11; 11-14; and 14-18.

Using this framework in relation to online bullying, for example, a child aged 7-11 should be able to 'describe ways people can be bullied through a range of media (e.g., image, video, text, chat)'. While a child aged 11-14 should be able to 'explain how to block abusive users'. However, it should be recognised that there is not consistency across different organisations and platforms in the bracketing of age groups. For example, the International Telecommunication Union (ITU) guidelines – prepared in the context of the Child Online Protection (COP) Initiative, which are designed to act as a blueprint which can be adapted internationally to establish the foundations for a safe cyberworld for children – separate children into three age groups: 5-7; 8-12; and 13+.

It is therefore important to closely examine developmental factors concerning the impact of technology on children and young people. However, given that there are many confounding variables, and our review of the cognitive development literature suggests that there is insufficient evidence to correlate stages of development with specific online risks and harms, it is beyond the scope of this research to examine the issue of age and developmental factors in more depth. As the Royal College of Psychiatrists note, in order to explore this issue further, what is needed are more *"longitudinal research studies with children and young people at different developmental stages examining whether technology causes harmful outcomes, as well as potential benefits"* (2020, p.49).

Finally, there are issues surrounding correlation/association and causation to be considered. The House of Commons inquiry, for example, found that the majority of published research does not "provide a clear indication of causation, but instead indicated a possible correlation" between social media/screens and a particular risk or harm (2019, p.3). This is supported by the Royal College of Psychiatrists (2020) who say that "the evidence base is still emerging and many of the studies listed describe associations that do not determine causality" (p.8).

To use an example given by YoungMinds and The Children's Society (2017) in evidence to the House of Commons inquiry (2019), it is unclear whether "young people experiencing low wellbeing are more likely

¹⁸ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/896323/UKCIS_Education_for_a_Connected_World_.pdf

to use social media excessively (as a support network for example), or whether those who use social media excessively are more likely to develop low wellbeing.”¹⁹ Similarly, Pluhar et al. (2019) argue that disorders such as Attention-Deficit/Hyperactivity Disorder (ADHD), affective disorders, and Autism Spectrum Disorder (ASD) may both predispose children to Problematic Interactive Media Use (PIMU) and also result in PIMU.

As noted above in respect of age and developmental stages, part of the problem is that the literature is mostly comprised of cross-sectional, rather than longitudinal, studies. As observed by Nowland et al. (2018) regarding loneliness: *“Drawing conclusions about the impact of the digital world ... is difficult because there are contradictory findings, and cross-sectional studies dominate the literature, making causation difficult to establish”* (p.70).

Keeping these issues in mind, this chapter will explore possible risks and harms to children and young people going online, and using VSPs specifically, wherever this evidence exists. This research is then synthesized into the creation of a framework of risk, which may lead to various mental, moral and physical harms.

2.2 Online risks: An overview

Potential risks of children going online have been well documented in the literature. For example, in a survey of 1,696 11-18-year-olds in the UK, the main risks identified were interaction with strangers, violence and hatred, sexual content and bullying (NSPCC, 2017). It is noted that exposure to ‘inappropriate content’ may be particularly prevalent on VSPs with a live streaming functionality. Research by Stonewall and Childnet (2020) found online risks to include: bullying, pornography, abusive language/comments, violent/obscene videos, news stories, animal abuse, self-harm and suicide content, hate, and being asked for explicit photos.

In the EU kids online report, risks - which varied across countries - were found to include bullying, hate messages, viruses/spyware, spending too much money on apps/games, excessive use, receiving unwanted sexual requests, seeing sexual images, and communicating with strangers (Smahel et al., 2020). And the Online Harms White Paper (February, 2020) lists some of the “illegal and unacceptable” content which young people are at risk of, to include: abuse, harassment, intimidation and bullying; the spreading of undemocratic values; one-sided algorithms; terrorist groups spreading hate, radicalising vulnerable people, and livestreaming terror attacks; child sex offenders grooming children and livestreaming abuse; the spreading of messages about gang violence and culture; exposure to harmful content such as suicide and self-harm; and addiction.

One typology of risks that has been developed focuses on the three C’s, namely: (i) content, (ii) contact, and (iii) conduct risks. A literature review conducted by UKCIS (Livingstone et al., 2017) presented the three C’s in the following table:

¹⁹ Written evidence - YoungMinds and The Children's Society (parliament.uk)

	Content Child as receiver (of mass productions)	Contact Child as participant (adult-initiated activity)	Conduct Child as actor (perpetrator/victim)
Aggressive	Violent/gory content	Harassment stalking	Bullying, hostile peer activity
Sexual	Pornographic content	'Grooming', sexual abuse on meeting strangers	Sexual harassment, 'sexting'
Values	Racist/hateful content	Ideological persuasion	Potentially harmful user-generated content
Commercial	Advertising, embedded marketing	Personal data exploitation	Gambling, copyright in fringement

More recently, research by Internet Matters (Katz & El Asam, 2020) added a fourth 'C': 'cyberscams'. This category includes risks to children such as their social media accounts being hacked, personal data stolen, credit card details being used, and/or being tricked into paying for something unwanted or fake goods. These types of behaviours may also sometimes be referred to under the broader umbrella term of cyber deviance (e.g., Ford et al., 2018).

When it comes to broadly quantifying how many children encounter online risks Jigsaw (2020), in a report commissioned by Ofcom and the ICO, found that 27% of children (N=2,001) expressed spontaneous 'concerns' about going online. Of these:

- 59% related to interaction with other people and/or content (e.g., bullying, unwelcome friends/follows, offensive videos, creepy/dangerous people, paedophiles);
- 28% to hacking/security (e.g., personal information being stolen, private information being made public, scams, fraud); and
- 3% to data/privacy (e.g., personal data processed without consent, data protection).

2.3 VSPs and online risks

Much of the evidence surrounding VSPs and online risks considers livestreaming. For example, NSPCC guidance²⁰ to parents about livestreaming and video apps warns that risks may include children: feeling pressurised; communicating with people they don't know; having videos recorded of them/shared without their consent; receiving nasty/negative comments; viewing adult/inappropriate content; and having their personal information/location shared.

Parent Info²¹ lists possible risks of livestreaming to include it being used to broadcast abusive or harmful behaviour; young people having accidents while live streaming; children inadvertently watching inappropriate live-streamed content; receiving negative comments; over-sharing personal information; contact from strangers; exposure to sexualised content; and the loss of control of a streamed video once it is online as it can be recorded, shared and used to threaten or blackmail. Supporting this, a parental guide by Internet Matters²² lists risks of livestreaming to be inappropriate content; negative comments; 'live' grooming; sharing too much information; and negatively impacting on self-esteem and behaviour.

²⁰ <https://www.nspcc.org.uk/keeping-children-safe/online-safety/livestreaming-online-video-apps/>

²¹ <https://parentinfo.org/article/live-streaming-a-parent-s-guide>

²² <https://www.internetmatters.org/resources/parents-guide-to-live-streaming-and-vlogging/>

In respect of parental concerns about livestreaming, Internet Matters & Huawei's (2018) survey of 2,000 parents about their children's experiences of livestreaming and vlogging found that parents were most concerned about their children sharing personal information with strangers; negative impacts on their attitude to others and engaging in dangerous behaviour/mimicking what they see; bullying/trolling and coping with negative responses; being obsessed with creating perfect content; unrealistic expectations (e.g. of a luxury lifestyle); and severe consequences to mental health.

Looking at VSPs more generally, Ofcom's Online Nation (2020) research asked children and adults about their concerns and actions related to VSPs.²³ It was found that 87% of adults and 79% of children had concerns about children using VSPs. The highest rated concerns from children related to:

- bullying/trolling (40%);
- viewing harmful content (37%);
- receiving private messages from strangers (38%); and
- watching age-inappropriate content (33%).

While the NSPCC (2020) cautions that VSPs can lead to children feeling pressured; communicating with people they don't know online; having videos recorded/shared without their consent; receiving negative/nasty comments; viewing adult, inappropriate and upsetting content; and having their location and personal information shared.

Risks may vary by platform. For example, a freedom of information request by the NSPCC (2019) found that Facebook-owned social media apps were the worst for child grooming. In an 18-month period, Facebook, Messenger, Instagram or WhatsApp were used in 3,203 (out of 5,784) recorded instances; notably not all were VSPs. A systematic content analysis of TikTok videos posted in 2020 found links to the Far-right, with extremist videos, commentary, symbols/pictures (Weimann & Masri, 2020).

Parent Zone's guide²⁴ for parents notes possible reasons why VSPs specifically may enable or facilitate such risks, including: being very difficult to moderate; encouraging children to do things they wouldn't do face-to-face due to the distance created by their screens; being inherently impulsive, with no means of editing what is shared, which they might later regret; facilitating the inadvertent viewing of abusive and harmful behaviour which is being broadcasted; increasing young people's exposure to negative comments; and endangering children's privacy (e.g. wearing a school uniform in a video).

Expanding on the unique features of VSPs that may enhance risks, in an article aimed at parents and children, former NSPCC Policy Officer Charlotte Lynch (2020) warns that: "Videos are live so you don't know what you will see when watching other users. This can lead to children seeing *inappropriate content*. Other users may post *nasty comments on your videos* and if you don't turn on *privacy settings*, strangers, including adults, may be able to watch or talk with you."²⁵ Conor Monk (2020), Senior Anti-Bullying Coordinator at the Diana Award, said that VSPs "do carry risks. A stream might have a harmless title but offensive content.

²³ Adults were asked: "Which, if any, of the following concern you in relation to children using video-sharing sites?"

While children were asked: "Do any of the following things worry you when using video-sharing sites?"

²⁴ <https://parentzone.org.uk/article/live-streaming-everything-you-need-know-about-online-phenomenon>

²⁵ <https://www.internetmatters.org/hub/question/livestreaming-apps-risky-harmless-child-use/>

*As a broadcaster you may stream something that you later regret, but it's already been seen and saved by a potentially global audience."*²⁶

2.4 Specific Online Risks

The House of Commons (2019) inquiry into the impact of social media and screens on young people's health, which considered 170 pieces of written evidence as well as holding oral evidence sessions, expanded on the main risks that children may be exposed to. These are explored below, using both evidence from the inquiry and other sources identified in this literature review, focusing on defining and describing the phenomena, in addition to their prevalence. After exploring specific risks, broad harms that may arise from them will be explored in the subsequent section.

2.4.1 Hate

The online world has become a highly effective means for individuals and groups to be targeted, harmed, and marginalised (Awan, 2016), largely through the medium of online hate speech (Anstead, 2017). Although the term lacks a universally accepted definition, hate speech is broadly defined as a term to *"describe words that are used online to attack a person or group based on a personal characteristic"* (HMICFRS, 2018, p.4). Online hate speech – also referred to as hate content, hate material, or online hate – can manifest and be disseminated in various ways, including through words, pictures, images, symbols, videos, games and music which may be posted on social media/VSPs.

Although the Online Harms White Paper (2020) observes that we do not have sufficient data on the scale and scope of online hate, there is evidence that many children are exposed to it. For example, the EU kids online project (Smahel et al., 2020) found that, overall, the most frequently reported harmful content children were exposed to at least monthly were hate messages (average = 17%), varying from 4% (Germany) to 48% (Poland).

The UK Safer Internet Centre's (2016) survey of 1,512 13-18-year-olds found that 82% had witnessed online hate, in the form of 'offensive, mean or threatening behaviour' targeted at someone based on their race, religion, disability, gender, sexual orientation or transgender identity, which form the 'protected characteristics' which represent the five strands of hate crime which are centrally monitored by the police. Furthermore, 35% had seen friends posting offensive or threatening things online about people from a specific group; 24% had themselves been the target of online hate in the last year; and 74% said that online hate made them careful about what they post online.

Looking specifically at hate aimed at sexual orientation and transgender identity, Stonewall's (2017) School Report found that four in ten (40%) LGBT young people have experienced homophobic, biphobic or transphobic (HBT) abuse online. According to police figures, online hate crime relating to sexual orientation is the second largest category of hate crime and that relating to transgender status is the smallest (Davidson et al., 2019).

²⁶ <https://www.internetmatters.org/hub/question/livestreaming-apps-risky-harmless-child-use/>

However, empirical studies suggest otherwise, finding that transgender individuals are subjected to the most online abuse (e.g., Antjoule, 2016; Pearson & Magić, 2017; Bachmann & Goode, 2017; Walters, Paterson, Brown & McDonnell, 2017). It should be noted that most of these studies are conducted with adult populations or young people (aged 18-24). For example, Bachmann and Goode's (2017) examination of data from a YouGov survey of over 5,000 LGBT people's experiences of hate crime in Britain found that, in the last month, 23% of LGBT young people (aged 18 to 24) had experienced online abuse, while 34% of trans young people had experienced online abuse.

In an attempt to address such concerns, some social media platforms have committed to removing hate speech where identified. Facebook, for example, reported that in the first quarter of 2018 it had removed 2.5 million pieces of hate speech from its site (House of Commons, 2019).

2.4.2 Violence, incitement to violence and terrorism

Violent content and the incitement to violence is another area of potential risk. In the EU kids online report (2020) it was found that exposure to gory or violent images was the second most frequently reported harmful content that children were exposed to at least monthly (average = 13%), after hate messages. Children surveyed (N=220) in the Parent Zone report (Rosen, 2016) also reported seeing violent content regularly, which their friends often shared, such as videos of crimes (e.g., the Paris attacks). And Girlguiding's Girls' Attitudes survey (2017) of over 1,600 girls and young women in the UK (aged 7-21) found that 54% had come across unwanted violent or graphic images online.

Some definitions of hate speech include the requirement that it 'incites violence' (Awan, 2016). Giving evidence to the House of Commons (2019) inquiry regarding the incitement of violence via social media, Martin Hewitt, Assistant Commissioner of the Metropolitan Police, said that social media can 'glamorise' and 'normalise' violent and criminal behaviour, such as that from gangs, where 'taunting' and 'challenging' between rival gangs can escalate and lead to real world violence including homicide. Also giving evidence to the inquiry, Sheldon Thomas²⁷ from Gangsline told how 'tit-for-tat' gang activity was *"definitely played out on YouTube"* and that the VSP was also used *"first, to recruit young people, secondly, to get girls, and, thirdly, to promote wealth"* (p.28).

Children may also be exposed to terrorist content, propaganda, groups and individuals online. The Online Harms White paper (2020) notes that all five terror attacks in the UK during 2017 had an online element, and that online terrorist content and material is a key feature of contemporary radicalisation. They cite the example of Facebook, who reported that between April and June 2020, 8.7 million pieces of terrorist content were actioned.

Livingstone et al. (2017) note that there is very little research on the prevalence of online radicalisation of young people, who may be particularly vulnerable. However, in an analysis of the role of the Internet in the radicalisation of 15 terrorists and extremists arrested in the UK, Gill et al. (2015) found that younger offenders were significantly more likely to engage in extremist virtual learning and interaction than older offenders.

²⁷ A former gang member and now a consultant on gangs and youth violence for Gangsline.

2.4.3 Fake news and deep fakes

Around half of children now consume the news via the Internet and social media/VSPs, which may not always be accurate sources. Ofcom's news consumption in the UK: 2020 report found that the most common ways 12-15-year-olds find out about news are talking to the family (68%) and TV (67%), followed by social media (55%) and talking to friends (49%). It was further found that *"family, radio and TV continue to be considered the most accurate/truthful sources, while social media and friends are considered least truthful"* (p.108). Similarly, a report from the Commission on Fake News and the Teaching of Critical Literacy Skills in Schools (2018) found that almost half of older children in the UK get their news from websites and social media. However, half of children are worried about not being able to spot fake news, and nearly two-thirds now trust the news less as a result of fake news.

Similarly, in the US, Common Sense Media's report (2017) – which explored how children receive and perceive the news based on a survey of 853 children (aged 10-18) – found that less than half of children agree that they know how to tell fake news stories from real ones. In light of such concerns, in 2019 the Scout Association²⁸ launched an initiative to help children spot fake news. This included tips such as: (i) look at the source (who is making the claim?); (ii) ask questions (does the source have a vested interest or stand to make money?); and (iii) evaluate the evidence (is the source peer reviewed? Does it come from one piece of evidence or multiple pieces?).

Fake news is currently a particularly pertinent issue during the coronavirus pandemic. For example,²⁹ Dr Tedros Adhanom Ghebreyesus, Director-General of WHO, said: *"We're not just fighting an epidemic; we're fighting an infodemic. Fake news spreads faster and more easily than this virus, and is just as dangerous"* (WHO, 15 February, 2020).³⁰ Some examples of COVID-related fake news found by Ofcom's Online Nation (2020) report were: killing the virus by gargling in salt water, disinfecting clothes in the sun, or eating warm food/drink, and linking coronavirus to 5G technology. In response, some social media platforms/VSPs pledged to work together to address such rumours and misinformation.³¹

A relatively new phenomenon is that of 'deep fakes', which refer to "computer-generated replica of a person – be it a picture or video – usually doing or saying something that they have never, in real life, said or done" (House of Commons, 2019, p.29), frequently involving politicians or celebrities. In January 2020, Facebook announced that it would remove deep fake videos altered by AI, saying that they are misleading and distort reality, and contributed \$10million to a fund designed to improve deep fake detection technology (Shead,2020) ³²

²⁸ <https://www.scouts.org.uk/news/2019/september/how-to-spot-fake-news/>

²⁹ Speaking to the Munich Security Conference.

³⁰ <https://www.who.int/dg/speeches/detail/munich-security-conference>

³¹ For example, Facebook said it would remove content likely to result in "immediate and imminent harm"; Twitter content that "goes directly against guidance from authoritative sources," YouTube "medically unsubstantiated" COVID-related content in contradiction of WHO advice, and TikTok introduced an in-app reporting feature to enable users to report 'Covid-19 misinformation' (Ibid).

³² <https://www.bbc.co.uk/news/technology-51018758>

2.4.4 Advertising

Ofcom's Online Nation (2020) report notes that advertising is the main revenue source for most online platforms, with VSPs and other online platforms being primarily reliant on online display advertising. In 2019 the total UK online advertising revenue reached approximately £15.7bn, with Google and Facebook owned sites having 78% of the combined share. In the context of young people, research has found that children are concerned about the levels of advertising online (Livingston et al., 2017).

One issue is users being exposed to targeted advertising, as sites collect personal information. A European survey of parents (Lupiáñez-Villanueva et al., 2016) found that experiencing targeted/personalised advertising is relatively common, with just over 40% of UK parents saying that, as far as they were aware, their children had encountered this. Ofcom's Children's Media Lives (2020a) found that while most children saw adverts on TV, social media and in games, most younger children were not aware these were personalised. While research by Jigsaw (2020), commissioned by Ofcom and the ICO, found that 20% of children (N=2,001) aged 12-15 strongly disagreed or disagreed with the statement *"I don't mind if websites/social media sites use information about me to decide which adverts they show me"*.

In 2018, Facebook announced that users would see fewer advertisements and posts from businesses and brands on their news feeds. Instead, messages and photos shared by 'friends' would be prioritised to return to Facebook's core value of connectivity (Zuckerberg, 2018). However, this may not be entirely ingenuous, as adverts were replaced by updates from fan pages that users subscribe to, known as 'edge ranking', where a social media site's algorithm offers a user more of what they already follow and are interested in (Brown, 2020). Unlike adverts, these updates – even though they may take the form of adverts – have not seen a backlash due to users' motivations to read them because they already subscribe to their pages (Cheng, 2010).

2.4.5 Advertising of, and exposure to, alcohol and tobacco

Some types of advertising may be particularly risky to young people, such as those relating to alcohol and tobacco, despite it being illegal. Keller (2020) states that alcohol companies "are some of the most prolific creators of content on social media," having *"shifted much of their advertising budgets and focus to social networks such as Facebook and Twitter in recent years,"*³³ often using innovative, fun, creative adverts, with video content, contests, giveaways and games.

Griffin et al. (2018) conducted a systematic analysis of online marketing aimed at young people (under 25) in the UK by venues as well as alcohol brands, and focus groups with 53 young people aged just above and below 18. They found that alcohol brands were more popular on social media among younger (including underage) participants, with under-18s reporting having followed alcohol brands from as young as 12. Furthermore, less than 2% of posts by brands, and no posts by venues, included messages to 'drink responsibly'.

³³ <https://www.drugrehab.com/addiction/alcohol/influence-of-social-media/ne>.

Drinking may also be promoted by influencers. Hendriks et al. (2020) investigated 'alcohol posts' in a content analysis of Instagram posts of 178 popular influencers, finding that: 63.5% had posted about alcohol recently; alcohol posts were positive and social; although 19.5% of posts showed a clear alcohol brand, only a few disclosed this as an advertisement, and even fewer gave an educational slogan (e.g., "#no18noalcohol"); and posts with sponsorship disclosures received fewer likes and comments.

Alcohol posts may also be user-generated, with young people posting videos and photos of themselves drunk. Research has found both that (i) those who view online alcohol-related advertising/content are more likely to drink, to drink more frequently, and to drink to excess, and (ii) that those who post about getting drunk themselves, and dangerous drinking habits, are more likely to develop clinical problem drinking behaviours (Keller, 2020).

Tobacco companies are also increasingly using social media to target young people. For example, research by Kozinets (2019) found that 'Big Tobacco' often recruit young influencers to share photos of themselves smoking, frequently at glamorous (tobacco-sponsored) events, using appealing (but tobacco-unrelated) hashtags. And, while the influencers themselves may be of legal smoking age, those who follow them are often not. Kozinets says: *"You can call it stealth, undercover or guerrilla marketing if you wish. Whatever its name, this is 21st-century cigarette advertising that reaches millions of young people around the world."*³⁴

2.4.6 Pornography

Livingstone et al. (2017) found that exposure to online pornography is the top-rated content-related concern for children. More specifically, a survey of 1,001 children (aged 11-16) in the UK found that: 28% of 11-12-year-olds, 48% of 11-16-year-olds, and 65% of children by the age of 15 had seen online pornography (Martellozzo et al., 2016). Both of these studies found that such exposure is more likely to be unintentional/accidental, for example, through pop-ups, misleadingly named websites, or advertising³⁵ on illegal streaming sites.

Exposure to such adult content may affect children's attitudes and behaviour. For example, Peter and Valkenburg's (2016) review of 20 years of research in the area found that pornography use was associated with stronger gender-stereotypical sexual beliefs and more permissive sexual attitudes among adolescents; greater incidence of sexual intercourse; more casual sex; and increased sexual aggression. This is supported by the 2016 Girlguiding Girls' Attitudes Survey, which found that many girls and young women (aged 11-22) had experienced online sexism, harassment and abuse. For example, 21% have had sexist comments made to them; 20% have had unwanted pornographic imagery/film sent to them; and 7% have been threatened with sexual violence.

While Martellozzo et al. (2016) found that substantial minorities of older children – particularly boys – want to try out things they have seen in pornography, with the proportions wishing to emulate pornography

³⁴ <https://theconversation.com/how-social-media-is-helping-big-tobacco-hook-a-new-generation-of-smokers-112911>

³⁵ Such advertising may contain links to pornography, or the advertising itself may contain pornography.

increasing with age: 21% of 11-12-year-olds; 39% of 13-14-year-olds; and 42% of 15-16 year-olds. The more recent BBFC-commissioned research, 'Young people, pornography & age-verification' (2020), also found that the proportion of children who report having seen pornography at some point increases significantly with age. Notably, the percentages are higher than the 2016 study: 51% of 11-13-year-olds; 66% of 14-15-year-olds; and 79% of 16-17-year-olds.³⁶

In terms of children's overall attitudes towards pornography, Martellozzo et al. (2016) reported responses included it being unrealistic (49%), arousing (47%), exciting (40%), silly (36%), exploitative (38%) and scary (23%).

2.4.7 Sexting, naked selfies and nudes

Sexting is broadly defined as the practice of using digital technology to create, send, and receive sexually explicit texts, images or videos (Scott & Gavin, 2018). Although it should be noted that this is arguably an adult-centred understanding of 'sexting', with children seeing sexting as a textual activity (writing and sharing sexually explicit words), rather than visual activity (taking and sharing self-generated photographs of naked bodies – referred to by young people as nudes or naked selfies) (Martellozzo et al., 2017).

While the practice is legal between consenting adults in England and Wales, the production, sharing and possession of any indecent imagery of children aged under 18 is a crime, irrespective of how it was produced. Furthermore, any images taken and shared by children is illegal, even if within a consensual context, although children are rarely prosecuted (Miles, 2020). A study of 724 young people (aged 14-17) looking at such behaviour in the context of romantic relationships (Wood et al., 2015) found that 38% had sent sexual images to a partner during or after their relationship, and 49% had received them. Two in ten who reported sending sexual images indicated that they had been pressured into it, and it is notable that girls more likely to report this than boys (27% and 7% respectively).

In research by Davidson et al. (2016) in four EU countries, using an online survey, it was found that 17% of 18-25-year-olds had often or sometimes been asked for a sexual photo/video of themselves as children. While the EU kids online project (2020) found that, among those aged 12-16, the percentage who had received a sexual message in the past year ranged between 8% (Italy) and 39% (Flanders), with older teens engaging in more of the behaviour. Furthermore, such messages may be wanted or unwanted (an opportunity or a risk) as some children may welcome such messages, for example in the context of a romantic relationship. In the UK, a survey of 1,001 children and young people (aged 11-16) found that 14% had taken naked and/or semi-naked images of themselves (of these 123 had taken topless pictures of themselves and 27 had taken fully naked pictures), with just over half going on to share the images with others, and 49 having been asked to share their pictures (Martellozzo et al., 2017).

³⁶ <https://www.revealingreality.co.uk/wp-content/uploads/2020/01/BBFC-Young-people-and-pornography-Final-report-2401.pdf>

Also, in the UK, a survey by the NSPCC and LGfL of 40,000 7-16-year-olds found that, of the primary school children surveyed, one in twenty-five had been sent or shown a naked or semi-naked image by an adult. Of the secondary school children surveyed, one in twenty had been sent or shown a naked or semi-naked image by an adult. Of the primary school children surveyed, one in twenty had been sent a naked or semi-naked image by another young person. While, of the secondary school children surveyed, one in eight had been sent or shown a naked or semi-naked image by another young person. However, higher figures were reported by McGeeney and Hanson (2017), who found that over a third of young people, aged 14-24, have sent a 'sexual or nude' image of themselves.

2.4.8 Non-consensual sharing of sexual images and image-based abuse

Evidence heard by the House of Commons Inquiry (2019) found that sexting or sending naked images can lead to exploitation, blackmail, humiliation and reputational damage if, for example, the images are shared or threatened to be shared to a wider audience. This is known as revenge pornography, which became illegal in England and Wales in December 2015. The key characteristics of revenge pornography are that it: contains sexually explicit content, which may include images, photos, and/or videos; is usually created with the consent of those depicted; is further distributed without the consent of those depicted; is distributed online, which may be through email, social media, or on websites; is usually perpetrated in the context of a relationship breakdown; is usually thought of as perpetrated by males against females; and is motivated by 'revenge' (Davidson et al., 2019).

An "especially pernicious feature" of revenge pornography is 'downstream distribution', where the originally posted images are re-posted by third parties (Souza, 2016, p. 107). In these cases, it is often almost impossible to completely erase the images from the Internet as even if they are removed from one site they may have spread onto others, been downloaded/saved, or further shared (Kamal & Newman, 2016). Furthermore, the images are often accompanied by 'doxxing', where a victim's personal contact details (e.g., name, social media profile, home address, telephone number and email address) are published alongside the pictures (Franklin, 2014). It has been argued that doxxing can be as, or more, harmful than the images themselves, making the images easier to find and connect to the victim, and the victim more likely to be subjected to secondary victimisation (Souza, 2016).

However, as McGlynn and Rackley (2017a) observe, the term 'revenge porn' is problematic as it refers "to a relatively small, albeit pernicious, subset of private sexual images ... [which] concentrates on the motives of perpetrators, rather on the harms to victim-survivors" (p.3). Thus, the terms 'non-consensual pornography', 'involuntary pornography' and 'cyber rape' are also sometimes used, as is the broader term of 'image-based abuse'. Walker and Sleath (2017) define image-based abuse as: "The sharing of sexually explicit images (including photographs) and/or videos, without the consent of those depicted, where the motivation is unclear or not linked to revenge" (p.5). Motives for the non-consensual distribution of images may include, for example: fun/amusement; financial gain; notoriety; bragging; sexual gratification; control; harassment; and/or blackmail/extortion (Davidson et al., 2019).

2.4.9 Grooming, online child sexual abuse and exploitation

The House of Commons (2019) inquiry heard evidence for the potential for grooming, child sexual abuse and child sexual exploitation to occur online, frequently through social media. Livingstone et al.

(2017) define grooming as “a process of socialisation through which an adult engages with and manipulates a child or young person for the purpose of online sexual abuse (which may include offline aspects)” (p.52).

Grooming may involve adults who are already known to the child, who may exploit children’s use of technology to facilitate the grooming process by contacting them online (NSPCC & LGfL, 2018). In other cases, adults may set up fake profiles in order to connect with children, using stock profile photos, pretending to be the same age, and listing similar interests. For example, in 2016, the fake ‘Maddison Janer’ profile gathered over 400 friends – mostly teenage girls across Greater Manchester – then sending them explicit sexual messages/pictures/requests via Facebook messenger (Yarwood, 2016).

Although there is limited data on the prevalence of grooming, Livingstone et al. (2017) state that EU and US surveys suggest online child grooming or sexual solicitation rates of between 7-9%. In a statistically representative sample, research by the NSPCC (2019)³⁷ estimated that 1 in 25 (or 200,000 children aged 11-17) had been groomed in the UK. However, more broadly, research suggests that a significant number of children have communicated/connected with people they don’t know online. For example, a survey conducted in 11 primary schools and 19 secondary schools, found that half of secondary pupils and more than a quarter of primary pupils have communicated with people they do not know on social media (Clarke & Crowther, 2015).

Research by the NSPCC – based on Freedom of Information (FOI) requests – found that there were over 3,000 police-recorded offences for sexual communication with a child in England and Wales in 2017/18 (NSPCC, 2018). Furthermore, over one in seven children (15%) aged 11-18 have been asked to send sexual messages or images of themselves, and one in ten girls aged 13 or under have received such a request (Ibid). In 2019, the NSPCC reported that a total of 5,161 crimes of sexual communication with a child were recorded in 18 months, a 50% increase in offences recorded in the latest six months compared to the same period in the previous year.³⁸

Notably, both INTERPOL and Europol (2020) have reported surges in online child exploitation and coercion during the COVID-19 pandemic. Figures from the NSPCC support this,³⁹ with new data revealing that there were 10,391 cases of sexual abuse which involved an online element – including grooming, sexual assault and rape – recorded by all forces across the UK for 2019/20. Offences increased by 16% from the previous year, and it is the first time that the number of offences has exceeded 10,000 in a year. Although the FOI data does not include the period spent in lockdown, the report suggests that risks to children online have increased during this time, as have the number of Childline counselling sessions concerning online grooming.

³⁷ <https://www.nspcc.org.uk/about-us/news-opinion/2019/200000-young-people-groomed-on-social-networks/>

³⁸ <https://www.nspcc.org.uk/about-us/news-opinion/2019/over-5000-grooming-offences-recorded-18-months/>

³⁹ <https://www.nspcc.org.uk/about-us/news-opinion/2020/2020-09-03-cybercrimes-during-lockdown/>

2.4.10 Meeting online strangers in real life

Research exploring sex offender behaviour online has suggested for some time now that the grooming process can be very short, and that perpetrators may immediately employ sexualised language; in these cases, the perpetrator is usually a 'stranger' (Webster, Davidson & Bifulco, 2014). This research also identified a longer grooming approach where a relationship is established over a period of time; here the perpetrator builds a relationship with a child and would not be seen by the child as a stranger but an 'online friend'. This distinction is very important as it complicates awareness messaging for children. While the stranger warning is still relevant, it is also important to alert children to potential grooming in ongoing relationships with virtual friends.

Some grooming behaviour may ultimately lead to requests to meet up in the real world. For example, a survey by the Centre for Cyber Safety and Education (2019) with US fourth to eighth graders, found that 40% had used the Internet to connect with a stranger, with 11% going on to meet them at their home, the stranger's home, a park, mall or restaurant. The Stonewall and Childnet survey (2017) reported higher figures for the UK, finding that four in ten young people (39%) aged 13-19 had met up with someone they had originally met and talked to online. Of those who met up with strangers, nearly one in five (18%) did not tell anyone.

The EU kids online project (2020) found that between one in four and one in two children had communicated online with someone they had not met face-to-face before, with around one in six going on to meet such a person offline. Communicating with a stranger was more likely among older children and boys, although few gender differences were found for real life meetings. However, it should be noted that although meeting online strangers in real life may seem like an obvious risk, most children reported being happy after face-to-face meetings with their online contacts. This suggests *"that this activity can be an opportunity rather than just a risk"* (p.8). However, caution is needed in interpreting this finding as other research has suggested that young people may fail to recognise a grooming request, or grooming relationship, particularly in the early stages (Davidson & Bifulco, 2018).

Furthermore, as noted by Livingstone et al. (2017), we have *"very limited knowledge ... about the nature of the link between online abuse and contact offending"* (p.47). However, there have been high profile cases in which children have been groomed through social media and gaming, and later sexually assaulted or murdered. For example, Breck Bednar, aged 14, was stabbed to death by computer engineer Lewis Daynes, aged 19, in 2014, after meeting online on a gaming website in 2013 and communicating on software 'TeamSpeak'.

Innovations in technology may exacerbate risk. Arguably, a form of cognitive dissonance may dictate that the upsides of any particular innovation outweigh potential downsides, a phenomenon that may be described as a form of cyber utopianism (Aiken, 2016). This is exemplified by the new chat website and app 'Omegle' that can be downloaded to smart phones and advertises itself with the strapline 'Talk to strangers.'⁴⁰ Such positioning and marketing seems to go against best practice and protocols regarding the behaviour of children and young people in cyber contexts.

⁴⁰ <https://www.liverpoolecho.co.uk/news/liverpool-news/police-warning-parents-after-kids-19714260>

2.4.11 Child sexual abuse material

Linked to the phenomenon of grooming is child sexual abuse material (CSAM) involving sexually explicit images and videos of children and young people (Livingstone et al., 2017), as grooming is one way in which this may be created before being distributed.

In 2019, The Internet Watch Foundation (IWF) reported that they had assessed 132,676 URLs as containing child sexual abuse imagery, having links to the imagery, or advertising it. In 2018, the IWF removed 78,000 web pages, with Susie Hargreaves from the IWF telling the House of Commons inquiry (2019) that a web page could have one to 100 or 1,000 images or videos. She added, however, that “less than 0.2% is hosted in the UK. If we find it, we remove it in under two hours” (p.34). In 2019, the annual IWF report found that almost nine in ten (89%) known URLs containing CSAM were hosted in Europe, followed by North America, which hosted 9% of all known CSA URLs in 2019. The Netherlands hosts 71% of the child sexual abuse content found by the IWF, equating to 93,962 URLs.

This issue is particularly pertinent at the moment as recent figures from Europol (2020) suggest that since the start of the COVID-19 pandemic there has been an increase in the production and distribution of CSAM. The most recent research from the IWF supports this, finding that in 2020:

- the IWF processed 299,600 reports, an increase of 15% on the previous year;
- of these reports, 153,350 were confirmed as containing images and/or videos of children being sexually abused (an increase of 16% on the previous year);
- every report contained between one to thousands of CSA images and videos, equating to millions of images and videos; and
- of these, 68,000 reports were tagged as including ‘self-generated’ CSA content (a 77% increase on the previous year).

Looking at demographic characteristics, the IWF (2016) found that in the imagery they assessed as containing CSAM, over half (53%) of the children were thought to be aged 10 or under. A UK study by Quayle et al. (2017), which analysed 687 images from the UK International Child Sexual Exploitation Database, found that almost two thirds of the victims were girls, and the vast majority were white.

There is also emerging evidence that a substantial minority of CSAM is now self-generated by children. Recent data from the IWF found that, of the 132,676 webpages actioned during 2019, almost a third (29%) contained self-generated imagery, mostly by girls aged 11-13 (IWF Annual Report, 2019). In such cases, children are usually being persuaded, coerced or groomed into such activities (House of Commons, 2019). These may then be shared through networks in which users use cultural tropes such as ‘shout outs for shout outs’ or requests for ‘direct messages’ (Ofcom, 2020a).

This material may take the form of images/photos, videos or through livestreaming. The livestreaming/video streaming of child sexual abuse was a particular issue raised in evidence to the House of Commons inquiry (2019) by the IWF, the Children’s Commissioner for England, and Barnardo’s. Livestreaming is also described by the National Crime Agency (NCA) as a growing problem, with “*children’s own use of self-broadcast live-streaming apps now being exploited by offenders*” (2018, p.26).

Barnardo's reported that children as young as eight may be targeted by groomers who use online platforms to communicate directly with them using the comments function on live videos. They further found that almost a quarter of 10- to 16-year-olds (24%) said they or a friend regretted posting live content, with some having been groomed as a result. The IWF (2019) note that children who are receiving instructions from other users may think that they are streaming to a boyfriend or friend online, rather than to users who are then sharing more widely to paedophile networks.

In 2018 The Times also reported that it had *"discovered more than 100 grooming cases in which young people who broadcast online"* via the VSP YouTube, were *"manipulated into inappropriate behaviour by strangers," with promises of "thousands of extra subscribers to their channels"* if they complied, with groomers communicating with children in the comments section. Referencing figures from the NSPCC, Children's Commissioner Anne Longfield told the House of Commons (2019) inquiry that: *"One in 10 children involved in video streaming have been asked to take off their clothes. It is a lower amount for live streaming, but that is a dreadfully high figure and it is growing"* (p.33).

Taking a more in-depth look at prevalence, the NSPCC and LGfL (2018) survey of 40,000 children found that 6% of children that had livestreamed (and over 1% of all children) had been asked to take off or change their clothes, with primary-aged children being more likely to have been asked to do so. Furthermore, 10% of primary-aged children and 11% of secondary-aged children have been asked to remove their clothes when video-chatting. Hargreaves (House of Commons, 2019) argues that there is not at present the technology to detect when this is happening live, with the abuse often only coming to light after it has been recorded and then posted on sexual abuse websites. However, there are some technologies in development that claim to be able to detect what is happening in live video. For example, Yubo maintains that it has a filter that can detect nudity and stop livestreams until users put clothes back on,⁴¹ and a number of smaller organisations are also innovating in this area.^{42 43}

2.4.12 Exposure to harmful information/behaviours

Social media and VSPs may also expose children and young people to harmful information and behaviours, with research finding that the most harmful of these are often found to be exposure to eating disorders, self-harm, and suicide content. For example, David Austin from the British Board of Film Classification told the House of Commons inquiry (2019) that its large-scale public consultation had highlighted concerns *"about depictions of pro-anorexic content, self-harm and suicide"* (p.34).

Supporting this, in the EU kids online project (Smahel et al., 2020), children were asked about overall exposure to six types of harmful content. It was found that an average of 12% had seen content suggesting 'ways to be very thin'; an average of 10% had seen content related to 'ways of physically harming themselves'; and an average of 8% had seen content related to 'ways of committing suicide', at least monthly or more often.

⁴¹ <https://blogs.lse.ac.uk/parenting4digitalfuture/2019/04/24/hidden-in-plain-sight-safety-innovation-in-live-streamed-video/>

⁴² Sightengine: <https://sightengine.com/video-moderation>

⁴³ <https://www.nspcc.org.uk/about-us/news-opinion/2020/2020-09-03-cybercrimes-during-lockdown/DragonflAI>:
<https://www.dragonflai.co/>

There may be demographic differences in exposure to such behaviours. For example, a study by Oksanen et al. (2016) investigated the commonality of exposure to sites that advocate eating disorders, self-injury and suicide among American, British, German and Finnish respondents (N=3565) aged 15-30. They found that females were more likely to be exposed to eating disorder content, and males more likely to be exposed to self-injury and suicide content, across all four countries.

Upon investigating self-harm and suicide specifically, Singaravelu et al. (2015) analysed 314 websites related to these behaviours, finding that most could be accessed easily without restriction. Furthermore, while many sites were positive/preventive in tone, others were negative and might be seen as normalising and/or encouraging self-harm. For example, information about self-harm methods were common, with specific advice on how to self-harm in 15.8% of sites; encouragement of self-harm in 7.0%; and evocative images of self-harm/suicide in 20.7%.

In the UK, a cross sectional study of 3,946 participants in the Avon Longitudinal Study of Parents and Children (ALSPAC) looked at exposure to, and searching for, information about suicide and self-harm online (Mars et al., 2015). It was found that suicide/self-harm related Internet use was reported by 22.5% of participants; 11.9% had come across sites/chatrooms discussing self-harm or suicide; 8.2% had searched for information about self-harm; and 7.5% had searched for information about suicide. Sites offering help, advice, or support were accessed by a larger number (8.2%) than sites offering information on how to self-harm or take one's own life (3.1%).

VSPs, when compared to other social media platforms, have been found to rate highly for suicide-related content. For example, a survey of 2,059 young people by the NSPCC (2018) found that the VSP YouTube, as well as Facebook and Facebook Messenger, scored most highly for exposing children to suicide related content/videos. This was tragically illustrated in the recent case of Ronnie McNutt, aged 33, who in September 2020 livestreamed his own suicide on Facebook Live. The post then spread to TikTok, Twitter, Instagram and YouTube, and was accessed by both adults and children, many of whom saw the footage accidentally, with popular media reporting that they were traumatised.⁴⁴

2.4.13 Cyberbullying

Research suggests that between 6-25% of children and young people in the UK experience cyberbullying, which The Northern Ireland Anti-Bullying Forum define as *"bullying that takes place through electronic technologies such as mobile or smart phones, smart phone apps, social network websites and gaming consoles"* (House of Commons, 2019, p.36).

According to evidence given to the House of Commons inquiry from Barnardo's Northern Ireland and The Education Policy Institute, cyberbullying may consist of any of the following: name-calling/being mean online; posting embarrassing photos/videos of others; digitally manipulating pictures; posting pointed statuses; sexting requests; cutting and pasting pictures/status of others into group chats; deleting someone from a group chat; creating a website with mocking/critical content; and creating a fake profile to damage another's reputation.

⁴⁴ <https://www.mirror.co.uk/news/us-news/ronnie-mcnutt-kids-traumatised-after-22659284>

Children may be cyberbullied for numerous reasons, such as their appearance, gender, sexual behaviour, race, religious beliefs, disability, sexuality and gender identity (Livingstone et al., 2017). For example, the Childline bullying report 2015-16 (NSPCC, 2016) found that children reported receiving abusive comments about their appearance, sexual bullying, being told to kill themselves, feeling pressured into sharing sexual images of themselves, being threatened with images being posted online, and being bullied after the images had been widely shared.

A recent ONS report (2020) which used data on online bullying among children aged 10-15 from the Crime Survey for England and Wales (CSEW) found that one in five children had experienced at least one type of online bullying behaviour in the year ending March 2020, which is equivalent to 764,000 children. The most common bullying behaviours – experienced by 10% of all children aged 10 to 15 years – included being called names, sworn at or insulted, and having nasty messages about them sent to them. Almost three quarters of children (72%) who had been bullied online experienced at least some of it during school time.

Looking further at prevalence rates, in a sample of 11,166 children aged 14-15 in the UK it was found that 11% had experienced cyberbullying by phone or online (Lasher & Baker, 2015). These rates doubled in research conducted by the UK Safer Internet Centre (2017), which found that 22% of a representative sample of 1,500 children and young people aged 8-17 said someone had posted an image or video to bully them. Ofcom's (2020) media use and attitudes report found that around a fifth of children aged 8-15 said that they had been bullied in some way. Similar proportions experienced real life and online bullying; perhaps unsurprisingly, larger amounts of time spent online were associated with higher online bullying rates.

Finally, it should be noted that there are various sub-types of cyberbullying. For example, the phenomenon of 'self-cyberbullying' is a recently recognised one, where users may set up an alternative online identity to disparage and insult themselves. This behaviour has been likened to self-harm in that it may relieve emotional pain, and/or may be seen as a form of Munchausen Syndrome where such behaviour draws attention to the self (Martocci, 2017). More common is the behaviour of 'cyberstalking', which involves "continuously harassing and denigration including threats of physical harm" (Frith, 2017, p.36). This usually involves repeated unwanted electronic communication in order to cause harassment, alarm or distress to the victim (Davidson et al, 2019).

Lastly, 'trolling' is often viewed as a precursor to cyberbullying, although the terms are frequently used interchangeably, and there is no universally accepted definition of trolling. However, while both can be seen as forms of online harassment, which are influenced by anonymity and online disinhibition (Zezulka & Seigfried-Spellar 2016), a notable difference is that trolling involves the anonymous targeting of strangers, unlike cyberbullying - where the perpetrator is often known to the victim (Craker & March, 2016).

2.5 Harms that may arise from online risks

2.5.1 Introduction

The Online Harms White Paper (2020) notes that risky/harmful online content can be particularly damaging for children and *"there are growing concerns about the potential impact on their mental health and wellbeing"* (p.5). This is supported by the Royal College of Psychiatrists, who say that *"there is emerging evidence that increased use of social media or screen time may result in poorer well-being"* (RCPsych, p.30). While written evidence given to the House of Commons inquiry (2019) *"suggests that there may be some significant risks posed by social media use to young people's mental health and emotional wellbeing"* (RSPH, 2018). However, before exploring the mental, moral and physical harms that may be associated with online risks, several issues should be briefly noted.

Firstly, as observed at the start of this chapter, findings on risks cannot tell us *"what the consequences were on the child of viewing the worrying or nasty content and whether a particular 'harm' followed"* (House of Commons, p.20). As explored earlier, we can only posit correlations or associations between an online activity and harm, rather than claim a causal relationship. To use a specific example, the direction of the relationship between mental health and wellbeing, and social media, is often unclear as *"it could be, for example, that someone already experiencing a mental health problem is more likely to use social media"* (House of Commons, 2019, p.24).

Secondly, as also noted previously, harms to young people's mental health and wellbeing may be influenced and/or confounded/mediated by various factors. These include – but are not limited to – age, gender, sexual orientation, psychological vulnerability, baseline mental health, social isolation/connectedness, amount of time spent on devices/online, and platforms/sites. As observed by the UK CMO: *"Many factors affect mental health and it can be difficult to disentangle these factors from any effect caused by screen or social media use"* (2020, p.4).

Thirdly, particularly in the older literature, the use of screens/digital devices, or Internet use, is often considered in a broad sense, as opposed to distinguishing between specific online activities such as using social media or VSPs. However, this literature is still deemed relevant as broad Internet use will almost invariably include the use of social media/VSPs, given how ubiquitous their usage is among young people. In addition, where social media/VSPs are explicitly considered, this will be highlighted.

Finally, it should be noted that many of the risks, as considered above, may all be associated with similar types of harm, as considered below. For example, the literature identified illustrates that being exposed to risks such as hateful, violent or adult content, or being groomed or bullied, may all be correlated with harms such as psychological distress, anxiety, depression, self-harm or suicidal ideation (e.g. Livingstone et al., 2017; RCPsych, 2020). Simply being online doing any activity – particularly for long periods of time – may lead to physical health issues such as obesity, loss of sleep, and issues with cognitive and brain development (e.g. House of Commons, 2019). Thus, the harms articulated below will be considered in broad terms.

Keeping in mind issues surrounding the complexity of disentangling association, correlation and causation, various mental, moral and physical harms – alongside mediating and confounding factors where considered – will be explored below.

2.6 Mental, moral and physical harms

2.6.1 Psychological distress, anxiety and depression

Many of the risks considered in the sections above may be associated with what is often generally referred to as ‘psychological distress’ in children, which frequently includes measures of anxiety and depression. Broadly, a survey of teachers and young people (aged 13-20) found that 28% of young people and 44% of teachers think that the Internet is bad for young people’s mental health (Rosen, 2016).

Looking at social media use specifically, a systematic review of 11 studies – with a total sample size of 12,642 – measured social media use and depressive symptoms in children and adolescents, finding a small but statistically significant correlation (McCrae et al., 2017). A systematic review of 13 studies that considered the influence of social media use on depression, anxiety and psychological distress in those aged 13-18 – with a total sample size of 21,231 – also found “a general correlation between social media use and mental health problems” (Keles et al., 2019, p.88).

The association between social media and mental wellbeing may be mediated by various factors. Keles et al. (2019) found that the main risk factors for depression, anxiety and psychological distress for young people using social media were the amount of time spent (with heavy users fairing worse); certain activities (e.g. repeated checking for messages); personal investment (the act of putting time and effort into social media); and addictive or problematic use.

Supporting this, numerous studies have found that time spent on social media is positively correlated with poorer mental health. For example, a meta-analysis of 23 studies – with a total sample size of 13,929 – found associations between problematic/excessive Facebook use, psychological distress and poor wellbeing among adolescents and young adults, with effect sizes⁴⁵ found to be larger in older samples (Marino et al., 2018). A survey of 1,089 children and young people by YoungMinds and The Children’s Society (2017) found that more frequent users of social media were the most vulnerable to poorer well-being, anxiety and depression. More specifically, NHS Digital’s (2017) survey of the mental health of children and young people (aged 11-19) found that those with a ‘mental disorder’ were more likely to use social media every day (87.3%) than those without a disorder (77%).

Breaking this down further, the APPG (2019) report on Social Media and Young People’s Mental Health and Wellbeing found that while 12% of children who spend no time on social media have symptoms of mental ill health, this rises to 27% for those who use it for three or more hours a day. Data from the Office for National Statistics (ONS, 2015) also highlights that children who spend more than three hours on social media on a school night are more than twice as likely to show symptoms of poor mental health in comparison to

⁴⁵ Effect size is a statistical concept that measures the strength of the relationship between two variables on a numeric scale.

those who spend no time, or less than three hours. However, Chassiakos et al. (2016) found that research suggests a 'U-shaped relationship' between the amount of Internet use and depression: with increased risks for depression at both the higher and lower ends of Internet use.

Other factors may also influence how Internet/social media use may impact on wellbeing. For example, a technical review of the evidence surrounding digital media and children and young people's mental health found that passive users of social media (who simply view others' content) may be more likely to experience depression, poor wellbeing and life satisfaction, as compared to active users (who interact with others/post content) (Chassiakos et al., 2016).

Effects may also vary by platform. For instance, a UK survey of 1,479 16–24-year-olds about five social media sites/VSPs found general effects to include anxiety, depression, lack of sleep, negative body image, and creating feelings of FOMO (Fear of Missing Out) (RSPH, 2017). Respondents ranked Instagram as the worst and YouTube as the best, on average, across 14 health and wellbeing related questions.⁴⁶ Furthermore, those who spent more than two hours per day on social media were more likely to report poor mental health, psychological distress, anxiety and depression.

However, in drawing conclusions about the Internet, social media and VSPs, and psychological distress, we need to be mindful of issues surrounding causation/correlation and methodology (Altman & Krywinski, 2015). As McCrae et al. (2017) note of their review: the studies varied widely in methods, sample size and results. For example, many studies are cross-sectional and, of those that are longitudinal, they are often of limited duration which makes the "clinical significance of these findings nuanced" (p.315).

2.6.2 Loneliness and isolation

Internet/social media use may also increase loneliness and isolation, as the time spent interacting/connecting with 'friends' on social media may decrease real world interaction. This may have negative implications in terms of loneliness and isolation, as face to face interaction has been consistently found to protect against loneliness (Primack et al., 2017).

Research from the NSPCC (2020) also found that lonely children are twice as likely to be groomed online. In a survey of 2,000 young people aged 11-17 it was found that abusers target children who have expressed vulnerability online. It was found that 4% of children had sent, received or been asked to send sexual messages to an adult, which more than doubled to 9% for children who felt lonely, unhappy, and rely on social media.

The association between social media use and loneliness is supported by studies by Jean Twenge and colleagues in the US. Twenge et al. (2019) investigated birth cohort differences in the frequency of in-person social interaction with peers among US adolescents, using data from two large-scale surveys spanning several decades (N=8.2million), comparing four generations of American adolescents

⁴⁶ These questions related specifically to: health awareness, access to health information, emotional support, anxiety, depression, loneliness, sleep, self-expression, self-identity, body image, real world relationships, community building, bullying and FOMO.

(Boomers, GenX, Millennials, and iGen) at the same age. They found that younger cohorts spent less face-to-face time with their friends across different contexts (e.g., socialising, going to parties, movies and malls, and dating). This decrease in face-to-face social interaction happened while an increase in digital media use among adolescents occurred; furthermore, self-reports of loneliness increased rapidly among adolescents during this time (Anderson & Jiang, 2018; Twenge et al., 2018).

Certain online activities may be particularly associated with loneliness. For example, Pluhar et al. (2019) found that 'Problematic Interactive Media Use' - including information-bingeing on short videos, social media, pornography, and uncontrolled gaming - may result in social withdrawal. Yu et al. (2018) found that, in a sample of 5,215 10-23-year-olds, loneliness and depression had fully negative mediating effects on life satisfaction associations with online shopping, pornography, and gaming.

Perhaps the most studied association is between online pornography and loneliness. Butler et al. (2017) found a significant positive association between the use of pornography and loneliness (N=1,246), with both increasing significantly in tandem with the other. Considering the mechanisms of this association, Butler (2018) argues that, as well as pornography usually being a solo activity, its sexual scripts - of eroticism, objectification, promiscuity, misogyny and domination - are intrinsically 'anti-relationship' and 'anti-attachment,' which may be particularly damaging in formative years. Increasingly unable to form healthy real-life relationships, due to pornography use/messages, the user thus becomes lonelier, increasing pornography usage, which creates a vicious cycle.

US psychologist Philip Zimbardo has studied both online pornography and gaming addiction and their relationship to loneliness. Zimbardo argues that boys are increasingly retreating into cyberspace, "*spending inordinate amounts of time alone in their room playing video games and alternating them with porn*" (quoted in Mederios, 2015).⁴⁷ Excessive use of this "*deadly duo*" may lead to them failing "*academically, socially and sexually,*" as they withdraw from normal social activities. Supporting Butler, Zimbardo argues that excessive watching of pornography can reinforce the idea of sex as something purely physical, leading to a lack of awareness about romance/love and making boys more comfortable watching pornography than being in real life relationships, as there is no risk of rejection.

This idea is echoed by psychologist David Kavanagh (2016), author of *Love Rewired*, who warns that boys addicted to pornography can be left without the confidence and skills required to form normal relationships. Steve Biddulph, psychologist and author of *Raising Boys*, cites the Japanese phenomenon of "shut-in" boys - hikikomori - which he believes is affecting a new generation of boys worldwide. He says of such teenage boys: "*Computer gaming and the Internet, including Internet pornography, can easily come to replace real-life interaction. Very quickly they fall behind in actual people skills, lose confidence, and can no longer relate to real girls*" (cited in Quinlan, 2016).

However, as seen in Chapter 1, the relationship between loneliness and Internet/social media use is not straightforward. Nowland et al. (2018), for example, argue for a "*bidirectional and dynamic relationship between loneliness and social Internet use*" (p.70). When the Internet is used to escape the social world and withdraw from the 'social pain' of face-to-face interaction it can increase feelings of loneliness. Yet when it is used to enhance existing relationships and make new ones, it can reduce loneliness.

⁴⁷ <https://www.wired.co.uk/article/arousal-addicts> .

Differences have also been observed between varying degrees of usage. For example, in a sample of 483 students from Istanbul, Sezgin et al. (2019) found that there was a significant positive relationship between digital addiction and loneliness, with males having higher levels of digital addiction and loneliness than females. In a sample of 1,188 Belgian adolescents, Wang et al. (2018) found that Facebook use was a predictor of decreased social/emotional loneliness among low-moderate users, while increased levels of social/emotional loneliness were found among heavy users. Thus, the relationship between loneliness and Internet use may be mediated by various factors.

2.6.3 Inadequacy, low self-esteem and poor body image

Children and young people also report that social media/VSPs can make them feel inadequate in various ways, such as negatively impacting on their self-esteem and body-image. These feelings are frequently mediated by negative comparison with others, which has become known as the '*compare and despair*' effect, a term described by TIME magazine. As a report by YoungMinds and The Children's Society (2017), based on survey of 1,089 children and young people, concluded: it can be hard for young people not to compare their lives to others "*when newsfeeds are constantly full of pictures of 'perfect' lives. What young people see on social media often doesn't reflect real life*" (p.7).

This compare and despair effect (as described above) may lead to poor mental health outcomes. For example, Papamichail and Sharma (2019) found that pressure to conform and live up to unrealistic standards (e.g. body image/type, being socially/visually perfect) may negatively impact on young people's mental health. Quantifying this, NHS Digital (2017) found that over one quarter (27.3%) of young people compared themselves to others on social media, suffering poorer mental health than those who did not. Furthermore, 11-19-year-olds with a mental health disorder were more likely to agree (41.9%) that they compared themselves to others than those without a mental health disorder (25.0%).

There may also be other factors that influence the association between online social comparison and poor mental health. For example, NHS Digital (2017) found gender differences: for girls, those with a mental health disorder (54.8%) were more likely than those without (31.7%) to compare themselves to others on social media, while for boys there was no such association. There were also differences in types of disorder, with 48.3% with an emotional disorder comparing themselves to others, compared with 28.7% with behavioural disorders, and 18.4% with neurodevelopmental disorders.

Social comparison and subsequent feelings of inadequacy may also vary by platform. The RSPH (2017) survey of 1,479 young people (aged 14-24) found that Instagram, in particular, was correlated with high levels of anxiety, depression, bullying and FOMO. This may be due to photos posted by others triggering feelings of comparison, which can lead to body image insecurity, inadequacy, fear of not being/looking good enough, or not having a fulfilling and exciting life (RSPH, 2017).

The use of online/in-app filters may add to the problem. Interviewees in a qualitative study which explored social media use in girls aged 14-17 expressed how, even knowing that photos were curated and filtered, they were still left feeling inadequate. As one girl said: "I know this is fake, but I still look at how her external image presents and compare it with how I feel inside" (Apter, 2019, cited in Brown, 2020). Supporting this, a study by Mascheroni et al. (2015) with children aged 11-16 in Italy, the UK and Spain, found that girls carefully filtered selfies in order to conform to popular beauty standards. The number of likes/comments received were then seen as popularity markers linking to peer validation and social acceptance/approval.

In the above study, the authors observe that the pressure to look a certain way can be taken to extremes, leading to girls developing eating disorders in the *"quest for a perfect body"* (p.4). However, it is not just girls who may feel such pressure. Boys too may suffer from poor self-esteem and body image when comparing themselves to (unrealistic) body types on social media. Naoise Kavanagh from Reachout, a support group for young people aged 12-25, says that young men are experiencing a *"wave of expectations"* about how their body should look: *"This is a new thing for young men. They are under a lot of pressure and they are worrying how to get a six-pack and what's the right kind of work-out"* (quoted in Quinlan, 2016).

Problems with comparison and feelings of inadequacy may be particularly acute among certain groups. For example, research with LGBT young people has found that the Internet may play an important role in exploring their identity, as they frequently look for their role models online. However, if such role models only show the best bits of their life this may lead to an *"unfair and upsetting comparison by LGBT children and young people with their own lives and experiences"* (Stonewall & Childnet, 2020, p.12). The authors conclude that: *"It's important that LGBT children and young people, like all children and young people, see a range of body types, gender identities, sexual orientations, ethnicities, disabilities and are more represented wherever possible"* (p.12).

2.6.4 Self-harm and suicide

Concern has recently been raised over the link between social media use, self-harm and suicide. Memon et al. (2018) note that, in the US, *"the increase in suicide rate parallels the simultaneous increase in social media use"* (p.384). While Anderson et al. (2018)⁴⁸ argue that evidence suggests that *"teen girls who spend more time using social media or smartphones and other devices are at greater risk for ... suicide-related behaviors compared with teen girls who spend less."*

Systematic reviews and meta-analyses have found correlations between Internet use and self-harm and suicidal behaviour among young people. For example, in a systematic review on social networking and self-harm and suicidal ideation among adolescents, Memon et al. (2018) found that *"greater time spent on online social networking promotes self-harm behavior and suicidal ideation in vulnerable adolescents"* (p.384). More specifically, it was found that spending time on social media can lead to increased exposure to self-harm content and subsequently to increased self-harm behaviour. This may be triggered by users receiving messages promoting self-harm, mimicking/copying the self-injurious behaviour of others, and trying out self-harm practices from shared videos.

Perhaps unsurprisingly, excessive levels of Internet use or addictive-like behaviours, may be correlated with greater harms in this area. In a systematic review of 46 studies (of those aged 25 or under), Marchant et al. (2017) found that the relationship between Internet use and self-harm/suicidal behaviour was particularly correlated with Internet addiction,⁴⁹ high levels of Internet use, and viewing websites with content about self-harm or suicide. They argue that there is significant risk of harm from online behaviour such as normalisation, triggering, competition, and contagion. A meta-analysis by Cheng et al. (2018), exploring the association between Internet addiction and suicidality found that, in comparison to adults, suicidal ideation was substantially higher in children and adolescents with Internet addiction.

⁴⁸ in a letter to the American Psychological Association (APA) where dozens of psychologists expressed concerns about the role of their profession in persuasive design and social media.

⁴⁹ The issue of addiction is explored further in the next section.

Supporting Marchant et al. (2017), the evidence suggests that young people who visit self-harm and suicide sites specifically, are more likely to think about carrying out such behaviours. For example, Dyson et al.'s (2016) systematic review of 26 studies of social media platforms used by young people to discuss and view deliberate self-harm found that – although there were benefits in terms of support – harms included normalizing and accepting self-harming behaviour; discussion of motivation, triggers concealment, suicidal ideation or plans; and live depictions of self-harm acts. A cross-sectional study of 3,946 participants in the Avon Longitudinal Study of Parents and Children by Mars et al. (2015) found that young people who self-harmed were both more likely to search for sites that offered advice on killing oneself, as well as sites that offered help and advice.

Thus, the Royal College of Psychiatrists (2020) observe that although evidence for any causal effect *"remains tentative ... studies provide evidence for an association between high levels of internet use and access to harmful content with suicidal behaviour and self-harm"* (p.31). Anecdotal evidence is also cited to support this, such as clinicians' experiences and high profile cases of young people who have taken their lives after viewing 'pro-suicide' content online. Indeed, the foreword of the report is written by Ian Russell, whose 14-year-old daughter Molly took her life. He writes that, in the wake of her suicide: *"Our search for answers soon led us to her social media accounts ... we found bleak depressive material, graphic self-harm content and suicide encouraging memes ...I have no doubt that social media helped kill my daughter"* (Russell, p.5, in RSPsych, 2020).

2.6.5 Addictive type behaviours/excessive use

Another potential negative impact of social media on young people's wellbeing is that of addictive type behaviours. Excessive Internet use, or children having difficulties controlling how much they go online, is referred to by some researchers and clinicians as Internet Addiction Disorder (IAD), Compulsive Internet Use (CIU), Internet Dependency, Problematic Internet Use (PIU), Pathological Internet Use or iDisorder. However, it should be noted that IAD (or any of its variations) is not included in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), nor is it recognised by WHO, although gaming disorder is included in the International Classification of Diseases (ICD-11). Therefore the idea of addiction in this area is highly contested and controversial, and will be referred to here as 'addictive type behaviours' or 'excessive Internet use'.

The phenomenon of excessive Internet use is particularly pertinent at the moment during the COVID-19 pandemic. For example, Ofcom's Life in Lockdown (August 2020) report found that lockdown affected children's routine and structure, meaning that they had a lot of spare time, much of which was spent alone online in their rooms *"spending many hours on their devices"* (p.10). For example, children talked of binge-watching videos on the VSPs YouTube and TikTok, as well as the video on-demand service, Netflix. TikTok was found to be the most popular platform, with only two users reporting not using it, and the others saying that they would spend hours each day on it, 'killing time'; 8 in 12 of the TikTok users also reported using the app to make and upload videos of themselves.

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Negative impacts of excessive Internet use have been found to include physical, social, emotional, functional and ergonomic impairments, including (but not limited to): depression, dishonesty, guilt, anxiety, inability to prioritize or keep to schedules, isolation, defensiveness, avoidance of work, agitation, mood swings, fear, loneliness, boredom with routine tasks, procrastination, backache, carpal tunnel syndrome, headaches, insomnia, poor nutrition, poor personal hygiene, neck pain, dry eyes/vision problems, and weight gain or loss (Gregory, 2019). For example, a meta-analysis of 41 studies relating to smartphone use and mental health issues (Sohn et al., 2019) reported that 23% of teenagers show symptoms of problematic Internet use, finding a consistent correlation between smartphone use and depression, anxiety, stress, poor sleep, and educational attainment.

However, there is controversy around this issue, with some recent research finding no significant correlation between excessive Internet use and poor wellbeing (e.g. Weinstein et al., 2017; Orben & Przybylski, 2019). Establishing causation is also problematic. A systematic review of 29 longitudinal studies concerning Internet Use (IU) and Problematic Internet Use (PIU) in adolescents and emergent adults by Anderson et al. (2016), found associations between IU-PIU and anxiety, social anxiety, depression, Attention deficit hyperactivity disorder (ADHD), Autism spectrum disorder (ASD), and general psychological distress. However, they found these individual factors to mostly be predictors of IU-PIU, although some studies also found that they were consequences of IU-PIU. The authors conclude that: *"The bi-directional relationships between psychopathology and PIU should be further examined by future longitudinal research"* (p.446).

Another key current area is the issue of addictive type behaviours by means of 'persuasive design' or 'behaviour design'. B.J. Fogg describes persuasive design as being concerned with *"how computers can be designed to influence attitudes and behaviors."*⁵⁰ In the context of social media, platforms may make use of what are known as 'extended use strategies', which are features that influence, prompt, direct or nudge users into staying engaged, in order to extend use (RCPsych, 2020). These include technical strategies – such as having no save button or forcing the use of auto-play – and emotional strategies – such as designing social obligations and/or anxieties into services (RCPsych, 2020). While extended use design features may include: notifications (buzzes, pings, vibrations); read receipts; auto-suggested content; loading wheels; endless feeds; quantification (e.g. the number of likes, retweets, friends); and obligation (e.g. streaks, read receipts).

It has been argued that such strategies take advantage of innate human drives, needs and desires, in order to drive revenue and increase financial gain (Freed & Owenz, 2018), and persuasive design strategies are now being criticised by the very people who initially designed them. For example, in the recent movie *The Social Dilemma* (2020), former employees at big technology companies describe the abuses of such features. These may be particularly harmful when children are involved. In 2018, US psychologists wrote an open letter to the American Psychological Association (APA) (Anderson et al., 2018), in which they accused "unethical" psychologists and social media companies of manipulating "children for profit," by keeping them online for unhealthy lengths of time. The letter quotes neuroscientist Ramsay Brown, who said

⁵⁰ <https://www.bjfogg.com/>

"Your kid is not weak-willed because he can't get off his phone ... Your kid's brain is being engineered to get him to stay on his phone".

Moreover, Anderson et al. (2017) argued that such excessive use is impacting upon children's mental wellbeing and academic attainment. They therefore recommended that the APA take action to educate parents and schools. However, we argue that such education alone, which is explored in Chapter 3, is not enough and that the use of AI solutions are particularly important here, as will be seen in Chapter 4.

2.6.6 Morality, personality traits, characteristics, and behaviour

Looking at the impact of social media on the emotional, social and moral development of children, Globokar (2018) defines the objective of moral development as the creation of *"an independent and responsible person who recognises the other as a person with the same rights and duties, who is capable of reasonable decisions and is able to choose the good for himself/herself, for society, and for the entire natural environment"* (p.553-4). However, Morgan and Jansson (2016) observe that *"alongside possible personal benefits and negative experiences, social media sites are also a place where moral values are put to the test, just as they are offline"* (p.5).

There is a small body of emerging research that explores how the Internet generally, and social media specifically, impacts upon morality. For example, The Pew Research Centre (2015) investigated technology use in emerging and developing nations, as well as measuring public opinion regarding the Internet's impact on society - including personal relationships, education, economy, politics, and morality - based on 36,619 face-to-face interviews in 32 countries with adults aged 18 and over. Of the five impacts measured *"the aspect of the Internet that generates the greatest concern is its effect on a nation's morals"* (p.31), with morality ranking as the highest concern in 28/32 countries surveyed. It was found that just over four in ten (42%) said the Internet had a bad influence on morality; in no country surveyed did a majority believe that the Internet had a positive influence on morality. There were, however, demographic differences; for example, young adults (aged 18-34) and those more highly educated were more likely to say that the Internet had a positive influence on morality.

In the UK, The Parent Poll⁵¹ surveyed 1,738 parents of children aged 11-17, to investigate the impact of social media on young people's moral character (Morgan, 2016). It was found that 55% of parents thought social media hampered/undermined their children's moral development, with only 15% agreeing that social media supports/enhances a young person's character, and four in ten being concerned or extremely concerned about the negative impact of social media on young people. Asked about the negative character traits they saw on social media at least once a month, the most commonly reported by parents were: anger/hostility (60%); arrogance (51%); ignorance (43%); bad judgment (41%); hatred (36%); and vanity (30%). Asked what character strengths they thought were lacking on social media, nearly a quarter (24%) mentioned forgiveness and self-control, followed by honesty (21%), fairness (20%) and humility (18%). Dr Blaire Morgan, who led the study, said: *"There are some surprising findings in the poll, not least the low level of agreement that social media can enhance or support a young person's character or moral development."*⁵²

⁵¹ By the Jubilee Centre for Character and Virtues at Birmingham University.

⁵² <https://virtueinsight.wordpress.com/2016/07/14/the-virtues-and-vices-of-social-media-sites/>

Responding to the concerns raised above, Morgan and Jansson (2016) considered parental regulation of adolescents' social media use when morally salient situations occur. Using scenarios where empathy and honesty could be seen as lacking, they explored adolescents' perceptions of possible regulation strategies that their parents could adopt in response. It was found that parents reportedly employ more controlling strategies when their children are faced with morally salient scenarios, taking a hands-on approach. This indicates that when moral issues arise online, parents prefer to be proactive and anticipate possible issues. This *"suggests that parents can play a crucial role in regulating adolescents' social media use and in providing guidance and advice to help moral values and virtues translate over to the online world"* (p.15).

This line of argument is supported by research linking character/moral values to parents' direct involvement in adolescents' online lives. For example, it has been found that when parents are close to their children and involved in their digital lives, children engage in more prosocial behaviours (e.g., Coyne et al., 2014; Coyne & Smith, 2014). While those adolescents who spend more time on their phones/social media, independently of parents, are less likely to be close to their parents and engage in prosocial behaviours. Thus, close interaction offers parents and children the chance to talk about prosocial values/virtues (Coyne & Smith, 2014), which may suggest that *"fair and appropriate regulation could increase the successful growth of moral functioning online"* (Morgan & Jansson, p.6).

2.7 Physical harms

2.7.1 Obesity

There is growing evidence for the association between screen-time/technology use and obesity/adiposity in young people. As Hoare (2016) says: *"With technological developments and modernised sedentary lifestyles has come an increase in diseases associated with inactivity such as obesity"* (p.1). It should be noted that much of the research in this area is about 'screen-time' generally, or Internet use broadly, as opposed to the use of social media/VSPs specifically.

The mechanisms of the association between technology use and obesity may be numerous, not only including sedentary behaviour, but also an increase in energy intake, the displacement of time available for physical activity, and/or a reduction in metabolic rate (Stiglic & Viner, 2018). Expanding upon this, written evidence received by the House of Commons (2019) inquiry from Dr Max Davie from the Royal College of Paediatrics and Child Health said that there were several ways in which screen-time might impact upon obesity: *"One is that it is sedentary. Secondly, it appears that you increase your intake of high density calorie food when you are engaged in screen time ... Thirdly, there is exposure to high-density food advertising, which online is not very well regulated"* (p.20).

A comprehensive review - of 12 systematic reviews - of screen-time on health by the Royal College of Paediatrics and Child Health (RCPCH, 2019) found that *"children with higher screen time tend to have a less healthy diet, a higher energy intake, and more pronounced indicators of obesity"* (p.3). The evidence suggests that watching screens may distract children from feeling full (which may contribute towards increased energy intake). Moreover, obesity - while a harm in and of itself - can also lead to various other health harms such as cardiovascular issues, diabetes and deep vein thrombosis (RCPsych, 2020).

Reviewing the evidence between screen-time and obesity, a task force from the European Academy of Paediatrics and the European Childhood Obesity Group developed a consensus statement, finding evidence of a strong link between media exposure and obesity levels across Europe (Mazur et al., 2018). A systematic review of 13 studies relating to the harms and benefits of screen-time for children and young people's health found moderately strong evidence for associations between screen-time and greater obesity/adiposity, as well as higher depressive symptoms. Moderate evidence was also found for an association between screen-time and less healthy diet and poorer quality of life. There was weak evidence for associations between screen-time and poorer cardiorespiratory fitness and poor sleep outcomes (Stiglic & Viner, 2018).

Perhaps unsurprisingly, some studies have found that those who spend longer online are more likely to be obese. For example, a systematic review of 235 studies relating to sedentary behaviour and health indicators in children and young people (aged 5-17), totalling 1,657,064 participants from 71 different countries, found that higher durations/frequencies of screen time were associated with 'unfavourable body composition', higher cardiometabolic risk scores and lower fitness (Carson et al, 2016).

Other studies have considered the association between Internet addiction (IA) or Problematic Internet Use (PIU) and obesity. For example, Tsitsika et al. (2016) investigated the relationship between PIU and obesity among adolescents in seven European countries (Germany, Greece, Iceland, the Netherlands, Poland, Romania and Spain) in a cross-sectional school-based survey of 14- to 17-year-old adolescents. It was found that 12.4% were overweight/obese, and 14.1% presented with dysfunctional Internet behaviour. Thus, *"the results indicate an association of overweight/obesity with PIU"* (p.617). These findings are supported by Artemis et al. (2016) using the same sample.

However, the RCPCH (2020) review found that although there was 'moderately-strong' evidence that higher television screen-time was associated with greater adiposity at all ages, there was insufficient evidence for an association between overall screen-time (i.e., across all types of screens) and adiposity. The RCPCH also note that most studies centre on television watching, calling for *"more and better research. This should particularly focus on newer uses of digital media, such as social media"* (p.3).

For example, future research might look at VSPs that actively encourage physical activity through, for example, shared videos of exercise routines, physical challenges, yoga and dance. Harris (2020) notes that the #wellness-tagged videos have been viewed over 180 million times, while its #health-tagged posts have been viewed 2.7 billion times; and may have recently motivated those in lockdown to exercise (Harris, 2020).⁵³

2.7.2 Sleep

Research has found that the use of digital devices generally, and using social media/VSPs specifically, at bedtime can affect children's sleep, being associated with difficulties in falling asleep, poor sleep quality, inadequate sleep quantity, and tiredness in the daytime (RCPsych, 2020). Carter et al. (2016) note that *"sleep is vital to children's bio-psycho-social development" and sleep disturbance may lead to "poor diet; sedative behavior; obesity; reduced immunity; stunted growth; mental health issues (such as depression and suicidal tendencies); and substance abuse"* (p.1202-3).

⁵³ <https://virtueinsight.wordpress.com/2016/07/14/the-virtues-and-vices-of-social-media-sites/>

Research has found consistent evidence for the association between screen-time and poor sleep. For example, the Carter et al. (2016) meta-analysis investigating the effect of portable media devices on sleep outcomes – which identified 20 studies, involving 125,198 children – found *“a strong and consistent association”* between bedtime media device use and inadequate sleep quantity, poor sleep quality, and excessive daytime sleepiness. Furthermore, children who had access to (but did not use) media devices at night were more likely to have inadequate sleep quantity, quality, and daytime sleepiness.

A literature review of screen-based media and sleep among American teenagers by LeBourgeois et al. (2017) found a negative association between screen-time and sleep health, mediated mostly by delayed bedtimes and reduced total sleep duration. The authors posit that the underlying mechanisms of these associations may be due to numerous factors, including: (i) time displacement, with time spent on screens replacing time spent sleeping and other activities; (ii) psychological stimulation due to the type of media content consumed; and (iii) the effects of light emitted from devices on circadian timing, sleep physiology, and alertness.

This last point is supported by written evidence to the House of Commons (2019) from Dr Heather Woods,⁵⁴ who also noted that there is evidence *“that the blue light emitted from devices has an effect on a chemical in the brain called melatonin. Melatonin facilitates the onset of sleep and blue light suppresses that.”* However, this is caveated with: *“you would need to be on a screen for a very long time and have it very close to your face for it to have an effect”* (p.22). Written evidence from the Royal Society of Public Health (RSPH)⁵⁵ also found that using social media at bedtime has more of a negative impact than in the day, which they posit may be due to LED lights interfering with/blocking brain processes that trigger feelings of sleepiness, in addition to the release of melatonin. This may mean that it both takes longer to fall asleep and fewer hours of sleep are had.

However, other research has found that daytime use of digital devices may also have a negative impact on sleep. For example, Hysing et al. (2015) explored both daytime and bedtime screen use and sleep in a cross-sectional population-based survey of 9,846 adolescents in Norway, from three age cohorts aged 16–19. It was found that adolescents spent a large amount of time during both the day and at bedtime on electronic devices, both of which were *“related to sleep measures, with an increased risk of short sleep duration, long sleep onset latency and increased sleep deficiency”* (p.1).

In an attempt to quantify the impact on sleep, Przybylski (2019) analysed data from a sample of American children (N=50,212) from the 2016 National Survey of Children's Health, to explore the extent to which time spent using digital devices predicted variability in children's sleep. It was found that every hour spent on digital screens was associated with 3-8 fewer minutes of nightly sleep and significantly lower levels of sleep consistency. However, the author notes that *“links between digital screen time and pediatric sleep outcomes were modest, accounting for less than 1.9% of observed variability in sleep outcomes”* (p.218), with *“contextual factors surrounding screen time”* having a greater influence.

⁵⁴ Lecturer in Psychology at the University of Glasgow

⁵⁵ Based on findings from their #StatusofMind report (2017).

While most research in this area is broadly related to screen-time and sleep, some more recent research considers social media in particular. For example, young people in the UK who gave evidence to the House of Commons (2019) inquiry *"highlighted how the need to be on social media, and contactable at any time, could disrupt sleep"* (p.21). Written evidence to the House of Commons inquiry (2019) from the Royal Society of Public Health (RSPH) stated that their own research had found that one in five respondents said that they wake up during the night to check social media messages, which leaves them three times more likely to feel constantly tired at school than peers who don't use social media at night.

However, the link between screen-time and sleep is not conclusive. For example, in evidence to the House of Commons (2019) inquiry, the RCPCH argued that there was *"weak evidence that screen-time is associated with poor sleep outcomes"* (p.21-22). And evidence from Professor Przybylski said that the effects of screen-time on sleep outcomes were *"complex"* and possibly *"bi-directional,"* with results from longitudinal studies suggesting people who cannot sleep *"are more motivated to use digital screens to manage their sleep problems, instead of a simple displacement effect where technology use directly decreases sleep time"* (p.22). Similarly, while the RCPsych (2020) report acknowledges evidence of an association between screen-time and sleep issues, it questions the issue of causality, calling for more longitudinal studies, research on the impact of different types of screen, and whether certain young people may be more vulnerable.

2.7.3 Cognitive and brain development

There is emerging evidence that the Internet may affect cognition, brain structures, functioning and development. For example, a recent large-scale review by Firth et al. (2019) investigated how the Internet may be changing people's cognition and brains, specifically in terms of attention and memory, finding that the Internet can *"produce both acute and sustained alterations in each of these areas of cognition, which may be reflected in changes in the brain"* (p.119). Although most studies have been performed with adults (RCPsych, 2020), a handful of studies with children and young people were identified in this review, which are explored below.

Looking at attention, it has been found that even short-term online engagement that encourages divided attention can produce temporary, yet significant, reductions in attentional capacities (Peng et al., 2018). Moreover, constant exposure to multiple types of online information can divide and impact upon attentional capacities, creating competing pulls on distraction and attention and creating cognitive overload. This is supported by research that has found that those who engage in extensive amounts of digital multi-tasking perform worse in sustained attention tasks (e.g. Loh & Kanai, 2016; Uncapher & Wagner, 2016).

Digital multi-tasking and attention is an under-researched area in children and young people, despite the fact that children grow up today using digital devices from a young age and at a vital stage in their cognitive development (Firth et al., 2019). However, recent research involving two three-wave longitudinal studies with three- and six-month time lags, investigated media multitasking and attention problems in a sample of 2,390 adolescents aged 11-16 (Baumgartner et al., 2017). The results suggested that potential adverse long-term effects of media multitasking on attention were present for early adolescents but not older teenagers.

Another study to consider brain functioning and Internet use among children and young people was performed by Takeuchi et al. (2018), who investigated the effects of the frequency of Internet use on regional grey/white matter volume (rGMV/rWMV) in the brain and verbal intelligence in children aged 5-18. While there were no significant associations in cross-sectional analyses, in longitudinal analysis a higher

of Internet use was associated with a decrease in verbal intelligence and a smaller increase in rGMV and rWMV of widespread brain areas. The brain areas involved were related to attention, as well as language processing, executive function, emotion, and reward.

Another area looked at by Firth et al. (2019) was how the Internet may affect memory processes, as the enormous source of online information at our fingertips has changed the way in which we retrieve and store knowledge, with people quickly becoming reliant on Internet search engines when facing unknown issues, reducing the need to memorise content and facts. For example, Dong and Potenza (2015) found that those asked to search online for specific information finished the task faster than those using printed encyclopaedias but were later less able to recall the information.

A series of studies (e.g., Wang et al., 2017; Liu et al., 2018) involving a six-day Internet search training programme looked at the impact of online searching on cognitive processes in young people. University students were given an hour per day of Internet search tasks and had cognitive/neuroimaging assessments before and after. The training reduced regional homogeneity and functional connectivity of brain areas related to long-term memory retrieval/formation. This suggests that relying on online searching may hinder memory retrieval, by reducing the functional connectivity and synchronization of associated brain regions (Liu et al., 2018). Moreover, after the six days, when asked new questions, participants favoured Internet searching, which was reflected in a recruitment of prefrontal brain areas needed for behavioural/impulse control (Wang et al., 2017).

One of the largest studies to date which looks at how the Internet may affect children's cognition, is The Adolescent Brain Cognitive Development (ABCD) Study (Walsh et al., 2018). A cross-national sample of 4,520 US children (aged 8-11) and their parents were asked about screen time, exercise and sleep, as well as having their memory and learning tested. The relationship between adherence to The Canadian 24-Hour Movement Guidelines for Children and Youth – which recommends at least an hour's exercise a day, 9-11 hours sleep, and two hours or less recreational screen time – and global cognition – language abilities, episodic memory, executive function, attention, working memory, and processing speed – were measured. Children who met all of these recommendations had superior cognition, with limited screen time and sleep having the strongest correlation to improvement.

However, Danovitch (2019) notes that empirical research on the cognitive effects of Internet use is far from conclusive (e.g. Orben & Przybycki, 2019; Mills, 2016; Wilmer et al., 2017) and, as noted earlier, the vast majority of research in this area is on adult samples. Yet the ways in which the Internet may affect the brain and cognitive processes is *"of particular relevance to the developing brains of children and adolescents, as many cognitive processes ... are not entirely innate, but rather are strongly influenced by environmental factors"* (Firth et al., 2019, p.119-120). Thus, *"an emerging priority for future research is to determine the effects of extensive online media usage on cognitive development in youth"* (Ibid, p.119).

2.8 Conclusions: A Framework of Risk

This chapter has highlighted the various risks and harms that may occur when children and young people use the Internet generally, and VSPs specifically. However, it is important to re-emphasise that risks may be, but are not always, associated with harms. In addition, as we have seen, the association between risks and harms can also be mediated by numerous factors, circumstances and situations. This review has highlighted that there are many confounding and mediating factors that mean that one child may be harmed and another not. Furthermore, there exist significant empirical issues surrounding correlation and causation.

The purpose of this review was to develop a taxonomy of the risks of harm, with a non-exhaustive literature review conducted to inform this development. The research team adopted an inductive/data-driven approach in order to allow findings to inform any conceptual framework. Whilst practicable and proportionate criteria in relation to risk of harm are important overall considerations, they are particularly important in terms of establishing a hierarchical classification system. However, in reviewing the literature on risks and harms, the tension between them, issues surrounding correlation and causation, mediating factors, and individual differences, we conclude that creating a hierarchy, taxonomy or classification system of harms, is neither feasible nor useful. It is also arguably not practicable or proportionate in terms of trying to create a system of relative magnitudes of harms. Consequently, we have created a framework of risk which may (or may not) lead to harm.

The original brief called for consideration to be given to mental, moral and physical risks of harm. However, we note here that these three categories are not discreet; rather, they overlap in many areas of the user journey, as illustrated in Figure 2 below. For example, sexual risks – such as grooming, child sexual abuse, child sexual exploitation and meeting online strangers in real life – may fall into any one, or all, of the three categories, it is therefore very difficult to disentangle these issues. It must further be reiterated that, as explored in Chapter 1, there are also many benefits to children and young people going online. Moreover, some apparent risks may also actually be opportunities and/or benefits. For example, meeting online strangers offline may seem like a *prima facie* risk, when in fact it may be a positive, if a child or young person meets a peer online who then turns into a real-world friend.

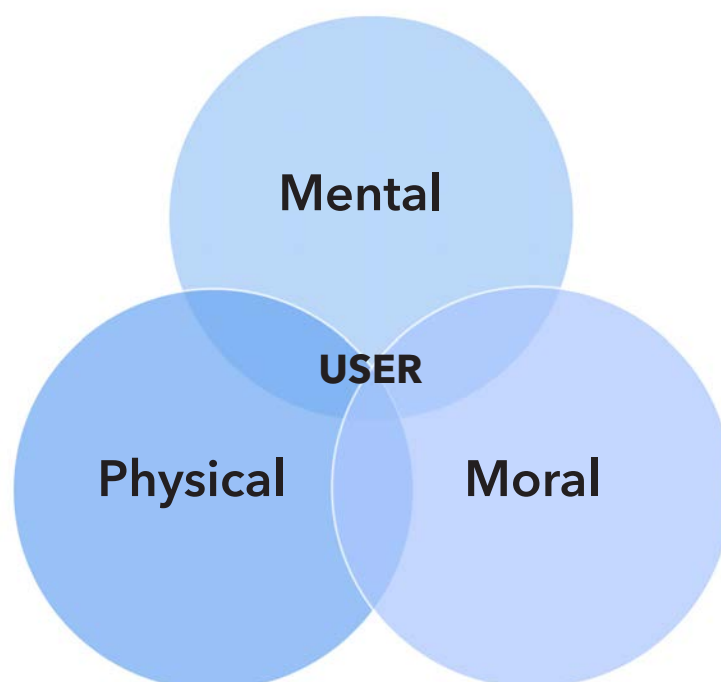


Figure 2: User Journey - Mental, Physical & Moral Overlap

We have therefore developed a framework of risk which can be used to consider a range of behaviours regarding both perpetrator and user, that could lead to potential risk of harm. These broad behaviours include: sexual, manipulation, aggression, self-injurious, cyber deviance, mental health/wellbeing, cognitive, physical and moral. Identification of risk allows for consideration of pre-emptive and protective measures that can minimise risk of harm, and arguably in doing so mitigate actual harm, whilst in the context of Chapter 1 findings, maximise the benefits of using VSPs.

The proposed framework of risk approach could perhaps be considered as a precursor to the proposed UK regulatory framework of online harms⁵⁶ and to inform any future developments in online regulation. Below we present the proposed framework of risk, grouped initially according to nine broad themes, with an indicative (although non-exhaustive) list of corresponding behaviours. As noted above, the framework is not discrete as there may be overlap within categories; rather it serves as a useful mechanism to visually map and classify risk, consider prevention, stage intervention, action cyber safety solutions, mitigate harm and, importantly, promote debate and discussion regarding further in-depth research and investigation.

⁵⁶https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/944310/Online_Harms_White_Paper_Full_Government_Response_to_the_consultation_CP_354_CCS001_CCS1220695430-001__V2.pdf).

2.9 Table: Framework of Risk

Table 3: Framework of Risk

<i>Sexual</i>	• <i>Pornography</i> • <i>Sexting</i> • <i>Naked selfies/nudes</i> • <i>Grooming</i> • <i>Child sexual abuse</i> • <i>Child sexual exploitation / coercion</i> • <i>Child sexual abuse materials</i> • <i>Livestreaming of child sexual activity/abuse</i> • <i>Meeting online strangers in real life</i>
<i>Aggression</i>	• <i>Hate speech</i> • <i>Violence/Incitement to violence</i> • <i>Extreme content</i> • <i>Cyberbullying</i> • <i>Online harassment</i> • <i>Cyberstalking</i>
<i>Manipulation</i>	• <i>Image/video filtering, editing and photoshopping</i> • <i>Fake profiles</i> • <i>Fake news</i> • <i>Mis/disinformation</i> • <i>Deep fakes</i> • <i>Radicalisation</i> • <i>Profiling</i> • <i>AI and algorithmic manipulation</i> • <i>Persuasive design, nudging and targeting</i>
<i>Self-injurious</i>	• <i>Exposure to self-harm</i> • <i>Exposure to eating disorders</i> • <i>Exposure to suicide content</i> • <i>Exposure to alcohol and tobacco</i>
<i>Mental health/ wellbeing</i>	• <i>Psychological distress</i> • <i>Depression</i> • <i>Anxiety</i> • <i>Loneliness</i> • <i>Isolation</i> • <i>Social withdrawal</i> • <i>Low self-esteem/inadequacy</i> • <i>Fear of Missing Out (FOMO)</i> • <i>Addictive type behaviours</i> • <i>Problematic Internet Use</i> • <i>Gaming disorder</i>

<i>Cognitive</i>	• <i>Attention</i> • <i>Memory</i> • <i>Executive function</i> • <i>Brain structure/functioning</i>
<i>Moral</i>	• <i>Judgement</i> • <i>Decision-making</i> • <i>Character traits</i> • <i>Values</i>
<i>Physical</i>	• <i>Sleep deprivation</i> • <i>Obesity</i> • <i>Tech ergonomic risk</i>
⁵⁷ <i>Cyber deviance</i>	• <i>Identity theft</i> • <i>Hacking</i> • <i>Cyberscams/Cyberfraud</i> • <i>Malware/Spyware</i>

⁵⁷ Although there is not yet a large body of research to support these cyber deviance categories, there is emerging evidence that young people are increasingly engaging in cyber deviant, delinquent and criminal behaviours, and therefore there are concerns for children and young people in terms of perpetration and victimology .

Chapter 3. Social Solutions

3.1 Introduction

Many organisations provide Internet safety awareness advice for parents and teachers, in order to educate both themselves and children about the benefits, risks and harms associated with children and young people using the Internet. In this chapter we have considered a range of social solutions to support children in staying safe online, including safety education advice from the government, safety approaches taken within schools, advice from charities and expert organisations, and existing advice for parents. We specifically highlight key advice from trusted sources recommended by the Department for Education (DfE), providing a summary that online platforms can consider in the design and implementation of services.

There have been calls in recent years for Personal, Social, Health and Economic (PSHE) education to be made compulsory in all schools, encompassing information about online harms, digital literacy and digital resilience (e.g., RSPH, 2017, RCPHC, 2019;⁵⁸ National Children's Bureau, 2019).⁵⁹ For example, the APPG (2019) recommended that PSHE education was *"made mandatory for primary and secondary school children ... and that the PSHE curriculum adequately delivers understanding of the harms and benefits specifically of social media to support digital resilience"* (p.22). The House of Commons (2019) inquiry stated that digital literacy and resilience should be *"integral parts of the curriculum for primary and secondary school students, through making 'Personal, Social, Health and Economic' (PSHE) education mandatory"* (p.46). And the House of Lords Communication Committee (2017) recommended that *"digital literacy should be the fourth pillar of a child's education alongside reading, writing and mathematics"* (para 30).

Digital literacy can be defined as *"the ability of individuals to use skills, knowledge and understanding in order to make full use of the opportunities offered by the new media environment as well as safeguard themselves from associated risks"* (Livingston et al., 2017, p.66). While digital resilience focuses on how, when children encounter harm, *"they know how to respond and are able to mitigate it themselves"* (YoungMinds to the House of Commons inquiry, 2019, p.43). This was reiterated to the inquiry by YMCA England and Wales, who suggested that building children's resilience was a means to help ensure that *"risk does not become harm,"* and Virgin Media who said that resilient online users were *"better equipped with the tools to respond to harms when they confront them"* (p.43).

Evidence given to the APPG (2019) similarly heard the importance of digital education and digital resilience. Evidence from Parent Zone, for example, talked of how young people need to be given *"safe, appropriate opportunities to develop the skills and understanding they need in order to fully engage with digital opportunities. This process includes making mistakes and recovering from those mistakes"* (p.22). However, The Children's Commissioner for England, Anne Longfield, told the House of Commons that, while children were often being taught digital literacy, they were frequently not taught emotional resilience and needed appropriate adult help for this. The DfE have recently announced that online safety will form a part of the school curriculum in the UK.

⁵⁸ In evidence to the House of Commons Inquiry, 2019

⁵⁹ Ibid

3.2 Online safety education

New statutory guidance from the Department for Education (DfE, 2020) which came into effect in September 2020, made Relationships Education and Relationships and Sex Education (RSE) for secondary-aged pupils in England compulsory, in addition to Relationships Education for primary-aged pupils in England, and Health Education for all pupils in state schools. However, PSHE (already compulsory for Independent Schools) was not made compulsory in state schools. The DfE argue that while PSHE education is important and necessary in all schools, drawing on good practice, a standardised framework isn't necessary as teachers should be allowed flexibility, being in the best position to understand their pupil's needs. Keeping safe online, however, will be taught in RSE and Health Education, where "pupils should be taught the rules and principles for keeping safe online. This will include how to recognise risks, harmful content and contact, and how and to whom to report issues" (DfE, 2020, p.27).

In designing and delivering service to minors, VSPs may find it useful to be aware that by the end of primary school children should know:

- that the Internet has many benefits for most people;
- about rationing time spent online, the risks of excessive use, and the impact of content on mental and physical wellbeing;
- how to consider the effect of their online actions on others and be respectful, and the importance of keeping personal information private;
- why some social media is age-restricted;
- that the Internet can also be a negative place where (e.g.) online abuse, trolling, bullying and harassment may occur, negatively affecting mental health;
- how to be a discerning consumer of information online (e.g.) understanding that information from search engines, is ranked, selected and targeted; and
- where and how to report concerns and get support.

By the end of secondary school, children should know:

- the similarities/differences between the online world and the physical world (e.g.) the impact of comparison with others online, over-reliance on online relationships, the risks of online gambling, how advertising is targeted, being a discerning consumer; and
- how to identify harmful online behaviours (e.g., bullying, abuse or harassment) and how to report/find support if they have been affected.

However, on a cautionary note, it has been argued that schools may still struggle, or fail, to deliver consistent and up to date information about online harms.

3.3 Guidelines for teachers and educators

Various organisations have developed suggested national guidelines for all teachers and educators delivering online safety education. Those listed below are recognised and recommended by the DfE (2020):

1. **The PSHE Association toolkit for online safety**⁶⁰ – Crossing the Line – encourages young people to think about their online behaviour and gives them knowledge of how to respond to online safety issues, report concerns and make good choices. The toolkit contains a series of films and lesson plans covering:
 - (i) cyberbullying;
 - (ii) sexting;
 - (iii) peer pressure; and
 - (iv) self-esteem^{61, 62}
2. **Childnet** also offers educators advice specifically about livestreaming, recommending they “teach students about livestreaming the same way you teach them about other aspects of online safety,” asking pupils about their experiences. Key livestreaming messages are as follows:
 - (i) the importance of keeping personal information safe;
 - (ii) what tools are available to keep young people safe on different services;
 - (iii) what to do if they see or hear something that worries or upsets them online;
 - (iv) things to be aware of when communicating with strangers online;
 - (v) the importance of thinking critically about all online content;
 - (vi) the importance of showing respect online and positive commenting; and
 - (vii) issues surrounding self-esteem and healthy relationships online.
3. **Thinkuknow** is a national educational programme from NCA-CEOP, a UK organisation which protects children both online and offline. The six key aims/principles are:
 - (i) Safeguarding first: the safety and wellbeing of each child always comes first.
 - (ii) Using a child-centred perspective: let children start the conversation, understand what the online world means to them and explore both positives and risks.
 - (iii) Promoting dialogue and understanding: young people are safest when they feel listened to and understood, and know that they can speak to trusted adults.
 - (iv) Empowering and enabling children: children have the right to be protected from harm, and build knowledge, skills and confidence to help them identify risk and get support.
 - (v) Not frightening or scare-mongering: alarmist education can be risky and ineffective, so avoid shocking or scaring young people, their families or professionals.
 - (vi) Challenging victim blaming attitudes: help young people understand that abuse is never their fault and build their confidence to ask a trusted adult for help.

⁶⁰ In evidence to the House of Commons Inquiry, 2019 <https://www.pshe-association.org.uk/curriculum-and-resources/resources/childnet-crossing-line-online-safety-pshe-toolkit>

⁶¹ Although aimed at key stage 3 pupils, it is claimed that the materials can be tailored to meet the needs of key stage 4 pupils

⁶² The toolkit was created by Internet safety charity Childnet as part of their role as a member of the UK Council for Internet Safety Executive Board Childnet also provide a range of other resources for schools as well as delivering programmes themselves, where their education officers offer “interactive, discussion-based sessions” for children across different age groups.

Thinkuknow has developed online safety toolkits (for different age groups) which contain short activities which can be delivered across all education settings, which cover themes such as: (i) online friendships/being kind online; (ii) sharing pictures and videos; (iii) live streaming; and (iv) gaming. The activities help children to:

- understand healthy/unhealthy behaviours in online and offline relationships;
- understand the importance of permission and consent (e.g. sharing images/videos);
- identify manipulative, pressurising or threatening behaviour and respond safely to it;
- understand the importance of seeking help from a trusted adult if needed,

Thinkuknow has also developed #LiveSkills,⁶³ which is a package of resources for 8-18-year-olds focusing on the features of livestreaming and the specific risks children can face, including activities, case studies and presentations. Through this young people will learn:

- how to identify the various tactics offenders use on livestreaming platforms;
- skills to think critically about the people they meet;
- how to identify and respond to pressure and manipulation online;
- how to deal with low confidence and self-esteem 'when live' and build resilience; and
- how to identify what is online sexual abuse and where to get support.

4. **UKCIS** guidance is also referenced by DfE non-statutory guidance set out in 2019,⁶⁴ specifically their Education for a Connected World (2018, updated in 2020). This provides a framework, or tool, to support the teaching of digital learning and online safety, using a whole school approach, outlining the different online skills children should have at different developmental stages.⁶⁵ Specifically, it focuses on eight different features of online education:

- self-image and identity;
- online relationships;
- online reputation;
- online bullying;
- managing online information;
- health, wellbeing and lifestyle;
- privacy and security;
- copyright and ownership.

3.4 Parental engagement

While education in schools surrounding online safety is vital, it is crucial that this be supported with the help and input of parents. So here we consider what advice is available for parents.

⁶³ <https://www.thinkuknow.co.uk/professionals/resources/live-streaming/>

⁶⁴ Teaching online safety in schools - Guidance supporting schools to teach their pupils how to stay safe online, within new and existing subjects'

⁶⁵ In 2020, UKCIS updated their framework in light of the new statutory changes, outlining its guidance to support the development of the curriculum in respect of PSHE education, RSE, Health Education and Computing. The tool helps to develop teaching, learning and guidance which supports children and young people to be knowledgeable, responsible and safe online.

A number of organisations provide guidance to help parents support their children in navigating the Internet safely: the DfE recommend parental guidance from the NSPCC, Internet Matters, Parent Info, Parent Zone, UKCIS, and the UK CMO. Much of this guidance broadly considers Internet and social media use, screen-time, and general online safety; however, some VSP-specific advice is considered at the end of this section. Parent Zone (2020),⁶⁶ as a member of UKCIS, give five key tips for parents, based on research, focusing on building an open dialogue and encouraging digital resilience:

1. **Building children's digital resilience keeps them safer than blocking or filtering:** it has been found that children who are able to self-regulate their Internet use are more digitally resilient, being better able to cope when they come across potentially harmful content. It is thus advised that parents should allow children to self-regulate their use by discussing boundaries, encouraging online interests, and supporting them.
2. **Don't just talk to your child about online safety:** don't only talk about potential harms but also take an active interest in your child's online adventures and what they are good at and enjoy online. If your child tells you something has worried them, make sure they know they won't get in trouble and can talk to you.
3. **Balance taking an interest in giving children space to be independent online:** teach key online safety messages and then allow children to explore, make their own decisions, and build online identities. Allowing children to internalise safety messages and then self-regulate leads to better decision-making in potentially harmful situations.
4. **Don't be afraid to set boundaries:** parental involvement and interest is positively correlated with children's online resilience, so while giving children freedom to explore independently, parents shouldn't be afraid to discuss boundaries. These might include collaborative rules about photo-sharing, and use of phones at meal times and bedtime.
5. **Concentrate on how children use digital media rather than for how long:** it's more important to focus on context and content rather than the time spent online per se.

Some organisations offer more specific VSP guidance and advice for parents and carers. For example, NSPCC⁶⁷ guidance to parents about livestreaming and video apps advise parents that if videos of their child have been shared they should:

- reassure and offer them support;
- avoid blaming them;
- report sexual images/videos to CEOP; and
- avoid 'sharenting' or sharing videos of their child or another child.

Internet Matters⁶⁸ provides tips for parents whose children are involved in livestreaming and vlogging, including:

- staying engaged with what their children do online and with whom;
- using tools to help them manage what they see and share;
- making them aware of reporting functions to flag people/content;

⁶⁶ <https://www.parents.parentzone.org.uk/morearticles/the-5-digital-parenting-rules-that-really-matter>

⁶⁷ <https://www.nspcc.org.uk/keeping-children-safe/online-safety/livestreaming-online-video-apps/>

⁶⁸ <https://www.internetmatters.org/wp-content/uploads/2019/04/Internet-Matters-Guide-Live-streaming-and-vlogging.pdf>.

- encouraging them to 'Go live' or record video in a public place; and
- watching vlogs/live streams with younger children to ensure they are age-appropriate, and encourage older children to critically evaluate what they watch.

Expanding upon this, Parent Info⁶⁹ says that, given the risks of VSPs, it is important for parents to have ongoing conversations with their children about online communication, suggesting using news stories as opportunities to ask their children about livestreaming, their views on it, and if it's something they currently do/have thought of doing. Having started the conversation, the topics of keeping safe on VSPs and how to report directly to platforms can be introduced.

Finally, the NSPCC (2020) suggest that parents:

- Turn on privacy settings to 'friends only' before their child starts livestreaming.
- Turn off location settings, so that followers can't see where they're posting from.
- Show children how to block and report other users.
- Have a conversation with children about the risks of talking to strangers online and the potential for grooming in ongoing relationships with 'virtual friends'.
- Be aware of what children share online and the risks of giving out personal information.
- Remind children that they shouldn't feel pressured into doing anything they are uncomfortable with, and if they are concerned to discuss it.

3.5 Checklists for parents and caregivers: considerations for VSPs

In designing and operating services for minors, online platforms should be aware of the key guidance offered to parents and caregivers by the identified trusted sources. Thus, social media/VSPs might consider issuing a summary of parental guidance/checklist, such as that offered in the table below.

Table 4: A checklist for parents and caregivers

General Guidance/advice	Actions	VSPs- children under 13	VSPs- Minors 13 plus
Safeguarding of personal information/privacy	Turn on privacy settings to 'friends only' before their child starts livestreaming.	•	•
	Turn off location settings, so that followers can't see where they're posting from.	•	•
	Not sharing/giving out personal information	•	•
Reporting concerns	Making children aware of reporting functions to flag people/content;	•	•

⁶⁹ <https://parentinfo.org/article/live-streaming-a-parent-s-guide>

General Guidance/advice	Actions	VSPs- children under 13	VSPs- Minors 13 plus
Communicating with others	Show children how to block and report other users.	•	•
	Have an ongoing conversation with children about the risks of talking to strangers online	•	•
	Tell/remind children they shouldn't feel pressured into doing anything they are uncomfortable with and if they are concerned to discuss it	•	•
	Help children to identify online sexual abuse and where to get support/report	•	•
Critical awareness	Encourage older children to critically evaluate what they watch.	•	•
Self-esteem and healthy relationships and respecting others	Help children understand healthy/unhealthy behaviours in online and offline relationships. Reinforce with older children	•	•
	Help children to understand the importance of showing respect online and positive commenting. Reinforce with older children	•	•
Enabling and monitoring	Encourage children to 'Go live' and not record videos in private places		•
	Teach children online safety skills /make sure they know about online resources	•	•
	Use tools to help manage what children see and share	•	•
	Stay engaged with what children do online and with whom	•	•
	Watch vlogs/livestreams with younger children to ensure they are age-appropriate. Teach key online safety messages and then allow children to explore	•	

	Help children understand the importance of permission and consent (e.g. sharing images/videos)	•	•
	Younger children should be supervised while livestreaming	•	

3.6 Framework of Social Solutions: Checklist

Presented below is a framework of social solutions which signposts educators and parents to key agencies and organisations providing guidance, educational awareness-raising programmes and information. This also provides a useful information resource for social media/VSPs wishing to explore expert advice in key areas from trusted sources.

Table 5: Framework of Social Solutions: A Checklist for educators and parents

Organisation	Specific programme or general advice
Childnet (children's charity)	Practical resources for all online safety issues for teachers working with children ➤ STAR Toolkit ➤ STAR SEN Toolkit
Digital Resilience Working Group (DRWG) (part of UKCIS)	Online hub to help schools, organisations, policymakers and companies understand digital resilience
DotCom Digital (created by children with Essex Police and the National Police Chief Council Lead for Internet Intelligence and Investigations)	Resource for schools to help prevent young people becoming victims of online grooming, radicalisation, exploitation and bullying
Government guidance (from the DfE)	Statutory guidance for: ➤ Relationships Education ➤ Relationships and Sex Education (RSE) ➤ Health Education
Internet Matters (not-for-profit organisation)	Helps parents/carers keep children safe online; a dedicated section for professionals; a parent pack to help schools engage with parents about online safety; downloadable guides
Internet Watch Foundation	Hotline to report potentially criminal online content, including CSAM

Organisation	Specific programme or general advice
National Society for the Protection of Children (NSPCC)	NSPCC General Site , NSPCC learning, Net Aware : resources to help parents keep children safe when using the internet, social networks, apps, and games
NCA-CEOP (from the National Crime Agency's CEOP Command)	Thinkuknow: Online safety education programme to safeguard children from CSA and CSE
Parent Info (from CEOP and Parent Zone)	Website for parents re. a range of online harms; helps schools engage parents with expert advice
Parent Zone	➤ Dedicated school zone: resources to help teachers educate their pupils on staying safe online and building digital resilience ➤ Dedicated parent zone: resources to help families, including parent guides on the latest digital trends/platforms
Personal, Social, Health and Economic Association (national body for PSHE education)	Crossing the Line: a toolkit for online safety covering cyberbullying; sexting; peer pressure; and self-esteem
SWGfL (part of the UK Safer Internet Centre)	Resources for schools covering online safety issues, including digital literacy/critical thinking. Runs three hotlines: ➤ Revenge Porn ➤ POSH helpline (Professionals online safety) ➤ Report hateful content
The Anti-Bullying Alliance (coalition of organisations and individuals)	Tools and resources to support schools prevent and tackle cyberbullying
The Diana Award (charity to reduce bullying)	Aimed at reducing bullying in schools: provides information to help schools tackle cyberbullying ➤ Be Strong Online Ambassador programme: a peer-led initiative to empower young people to increase the digital resilience of their peers
The UK Council for Internet Safety (UKCIS)(expands the scope of the UK Council for Child Internet Safety)	Education for a Connected World: the digital knowledge/skills young people should have at different ages

Organisation	Specific programme or general advice
UK Chief Medical Officers (UK CMO)	Advice for parents and carers on children and young people's screen and social media use
UK Safer Internet Centre (partnership between Childnet International, Internet Watch Foundation and SWGfL)	➤ 360 degree safe: self-review tool for schools to assess their online safety policy/practice ➤ Helpline: to support those working with children in the UK with online safety issues ➤ Safer Internet Day: annually develops assemblies, lesson plans, posters, and quizzes, for each Key Stage, to address a key online safety issue



Chapter 4. Online Safety Technologies (Safety Tech)

Chapter 1 explored the range of benefits associated with children and young people using the Internet, social media and VSPs. Chapter 2 focused on risks and harms associated with such use. In Chapter 3 we described the range of 'social solutions,' organisations and resources that provide trusted Internet safety awareness advice for parents, caregivers and educators that have explanatory value in terms of the benefits, risks and harms associated with young people using the Internet generally, and VSPs specifically. The literature reviewed in this section, Chapter 4, found that there are numerous cyber safety issues regarding VSPs that may be addressed through the emerging online safety technology sector now designated as "Safety Tech,"⁷⁰ namely: providing technology solutions to technology-facilitated problem behaviours.

4.1 Evaluation of measures

The Audiovisual Media Services Directive (AVMSD) sets out a list of measures which VSPs should adopt, as appropriate, under Article 28b(3) (European Commission, 2018) to protect users (including minors) from harmful content. The 10 measures identified by the AVMSD have been reflected in Schedule 15A to the new statutory provisions under the 2003 Communications Act (Ofcom, 2020, p. 7). This section considers those measures in relation to findings and recommendations from academic literature regarding minors, where key challenges have been identified - with the exception of measure (I) 'Handling User Complaints' as no academic literature was identified in the literature review that speaks to this issue. As the measures in Schedule 15A present certain challenges which are not easily resolved, solutions are complex and require further systematic research, therefore optimal resolutions are considered outside the scope of this review.

4.1.1 (A) Terms and Conditions or "Community standards"

Terms of service and community standards are determined by individual social media companies, with the intention that users conform to these standards as well as moderation mechanisms (Crawford & Gillespie, 2016). As such there are questions as to how these community standards are defined and implemented, and to what extent content is effectively moderated (Grygiel & Brown, 2019). Content moderation mechanisms are "a complex interplay between users and platforms, humans and algorithms, and the social norms and regulatory structures of social media" (Crawford & Gillespie, 2016, p. 2). Therefore, even in cases where there are robust community standards, there may be difficulty in imposing these standards (Grygiel & Brown, 2019), and this "lack of enforcement around community guidelines, coupled with the complexity and shortcomings of platform technology, has created a situation where social media platforms are unsafe" (Grygiel & Brown, 2019, p. 449). Issues of moderation are further discussed in following sections.

⁷⁰ <https://www.gov.uk/government/publications/safer-technology-safer-users-the-uk-as-a-world-leader-in-safety-tech>

4.1.2 (B) Advertising to Minors

Advertising is at the core of social media and Internet platform business models (Jhaver, Birman, Gilbert, & Bruckman, 2019). Facebook and Google dominate digital marketing; combined they constitute 58% of the \$111 billion market (Soper, 2018). Approximately £14 billion was spent on digital advertising in the UK in 2019, 80% of which was spent on Google and Facebook. The CMA notes that the number of adverts that consumers are exposed to on digital platforms is increasing. Adverts seen per hour on Facebook have risen from 40-50 in 2016 to 50-60 in 2019, and the average revenue per user on Facebook is now more than ten times higher than competitors. Notably, Facebook and Google are the primary platforms used in digital political advertising (Kreiss & McGregor, 2019).

Advertising is a fundamental factor influencing platform design and policy decisions, as social media and Internet platforms are economically motivated to increase site activity to, in turn, increase ad revenue (Jhaver, Birman, Gilbert, & Bruckman, 2019; Gillespie, 2018). This is achieved by drawing users onto the platform, following users when off the platform, while eliciting a great quantity and type of data (Gillespie, 2018). In turn, this data is either used to better target advertising or is sold to customers and data brokers (Gillespie, 2018). In short, digital platforms are a powerful persuasive tool.

It is anticipated that, in 2021, the digital advertising spends targeting children will constitute 37% of all advertising spending, totalling \$1.7 billion (SuperAwesome, 2019). YouTube in particular is the largest entertainment and advertising platform for children (notably not YouTube Kids) (SuperAwesome, 2019). On the basis of the research evidence presented in this report, the authors argue that there is an urgent need to establish stringent regulation around digital advertising to children, or advertising using children, in particular given the upwards trend of child and family influencers.

4.1.3 (C) User Advertising Declarations

SuperAwesome (2020): 7 best practices for kid-safe influencer marketing

1. Find the right creators: Brands should be encouraged to work with creators that do not create inappropriate content and create content that is a 'good fit'.

2. Disclose Paid and Gifted Relationships: Disclosures must be in compliance with the FTC and ASA and visible as soon as the kid sees the content. Use language clearly understandable by a younger audience.

3. Beware of Kids Giveaways: Picking a winner and sending prizes to kids requires processing and collecting kids' personal data, which under both COPPA and GDPR must be handled in specific ways, and with parental consent.

4. Set Clear Content Guidelines: Create content guidelines to explain the dos and don'ts of creating safe content for kids.

5. Ensure Influencer's Safety and Wellbeing: When working with child influencers and their parents, brand need to ensure a balanced life between social platforms, their education, and extracurricular activities is facilitated.

6. Pick the Right Call to Action: Advertising to kids needs to stay neutral and shouldn't incentivise kids to buy or get products, and a children's well-being should be considered paramount to persuasive messaging.

7. Build Kid-Safe Landing Pages: Create a child-friendly landing page (e.g. not a retail page) that doesn't collect their data.

Source: <https://www.superawesome.com/sacreators-best-practices-e-book/>

Advertising to children is persuasive: over 50% of children born after 2010 would purchase a product recommended by their favourite influencer; two thirds have purchased an item recommended in an influencer video; and influencers sway children and teen purchases over and above family and friends (see SuperAwesome, 2020 and references therein). It is therefore key that VSPs support 'influencers' to disclose that all advertisements are compliant with the U.K. Advertising Standards Authority (ASA), The Committee of Advertising Practice (CAP) and Competition & Markets Authority (CMA) regulations for influencer marketing (e.g., ASA, 2018; CMA, 2019). Specifically, CAP has produced a guide for influencers on making clear that ads are ads.

However, VSPs could go further and follow recommendations for best practices. For example, SuperAwesome (7 best practices for kid-safe influencer marketing, 2020) has published seven recommendations for child-safe influencer marketing – as detailed in the textbox above – recommendations that also follow The Children's Advertising Review Unit (CARU, 2020).

4.1.4 (D) Community Reporting/Flagging

In transparency reports some of the bigger platforms do report content that is removed; however, this is exclusively the result of 'takedown requests' from governments and companies (Gillespie, 2018). What is needed to complete the picture is an indication of the amount of content flagged by community users, how many community users flag content, and how reports are responded to (Gillespie, 2018). Moderation from reporting is undoubtably an enormous undertaking, particularly as most platforms have adopted a 'publish-then-filter' approach (i.e., a retroactive review) (Gillespie, 2018).

Content at this scale arguably cannot be subjected to editorial review (an approach adopted by traditional media) and notably is not regulated as editorial content. Whilst some automatic detection technology has been developed, many platforms are reliant (mostly or even exclusively) on community flagging/reporting (Gillespie, 2018). A significant problem, difficult to ignore, is the human cost to human moderation. The user reporting the content has already been exposed to harm, along with any other user who has viewed the same content, and significant psychological harms may result from being employed as, and therefore undertaking the work of a human content moderator (e.g. Dwoskin, et al., 2019; Newton & Casey, 2019).

There is great variability in reporting mechanism interfaces across platforms. Most incorporate a pop-up reporting window; however, across platforms there are differences in the level of detail requested about the complaint (Gillespie, 2018). It is argued that reporting mechanisms should be made more visible and standardised across platforms (Grygiel & Brown, 2019).

There are also instances where flagging mechanisms are misused: e.g., to create interest in types of content, online rivalry or organised flagging (Gillespie, 2018). Therein lies the second major problem: the inherent paradox on relying on a 'community' to police itself, in particular on mega-platforms such as Facebook where the 'community' represents 30% of the global population (Roser, Ritchie, & Ortiz-Ospina).

There is evidence that children know of reporting mechanisms on platforms. For example, research has found that 66% of 12-15-years-olds who go online are aware of reporting mechanisms, of which half (52%) have ever used them (Ofcom, 2018). However, there is evidence that younger users (11-12-year-olds) are much less likely to report than their older peers (15-16-year-olds) (Lilley, Ball, & Vernon, 2014). Any user (regardless of their authentic age) can report; however, those who circumvent age restrictions may be less likely to report harmful content (Blum-Ross, et al., 2018).

4.1.5 (E) Feedback Mechanisms

Once a report is submitted, there is little information provided to users about how this flag is received, processed and resolved (Gillespie, 2018). Furthermore, users are given little opportunity to fully explain why they report content or challenge the rules in how they are processed (Gillespie, 2018). There is also evidence that children may not receive responses to a complaint or are disappointed with the outcome (Green, Wilkins, Wyld, & Manning, 2019; Blum-Ross, et al., 2018).

4.1.6 (F) Age Assurance and the Verification of Children Online

Age verification continues to be problematic. Whether it is the age of digital consent,⁷¹ or technology companies' compliance with the US Children's Online Privacy Protection Rule (COPPA),⁷² age restrictions are arguably easily circumvented (Blum-Ross, et al., 2018). For example, some platforms

⁷¹ <https://fra.europa.eu/en/publication/2017/mapping-minimum-age-requirements/use-consent>

⁷² <https://www.ftc.gov/enforcement/rules/rulemaking-regulatory-reform-proceedings/childrens-online-privacy-protection-rule>

only require that terms of service are accepted, which contain information about age restrictions, but no independent proof of age is required (Blum-Ross, et al., 2018). In other cases, to circumvent age restrictions, users need only change their age information or tick a box to be able to or continue use (Blum-Ross, et al., 2018).

Furthermore, social media platforms claim not to have the mechanisms to prevent or identify underage users (Blum-Ross, et al., 2018). This is a complex issue that raises many questions about what to do next (Blum-Ross, et al., 2018). For instance, should underage users be identified using the same algorithms used for targeted marketing? Or, if made more difficult, would underage users turn to illegal means to be able to use platforms? However, what is clear is that greater consideration (in terms of legal procedures and interface design) is required to ensure that age verification is not an 'in name only' requirement (Blum-Ross, et al., 2018). It is, however, important to separately acknowledge the role of age verification as an 18+ age-gate measure to protect children from some of the key harms such as pornography.

The recent VoCO (Verification of Children Online) report (2020, p.5)⁷³ made a number of key recommendations regarding age assurance and verification:

1. Regulatory strategy for age assurance

"enable a regulatory landscape that incentivises platforms to actively recognise their child users, incentivises children to be honest about their age and encourages growth and innovation in the age assurance market,"
Recommendations:

"(a). Undertaking research on the risks posed to children by online services, to help inform the proportionate and risk-based use of age assurance. This research should engage with industry and subject experts. (b). Taking action to secure regulatory alignment between relevant current and emerging regulatory frameworks. A 'task force' of government and relevant regulators would help to deliver this"

2. Encourage industry adoption of age assurance

"For platforms to adopt age assurance they need to have confidence that the action they are taking is appropriate, enables greater safety for their users and does not impair the user experience."

Recommendations:

"(a). Developing industry benchmarks, facilitated through research on the risks posed to children by online services. This research should engage with industry, regulators and subject experts. (b). Developing best practice examples, in partnership with regulators and industry"

⁷³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/934131/November_VoCO_report_V4__pdf.pdf

3. Stimulate innovation in the age assurance market

"There is a growing market for age assurance. Innovation is needed to ensure a diverse range of platforms and users' needs are met. "

Recommendations:

"(a). Taking action to promote the age assurance market among industry and users. b. Supporting the development of industry standards to ensure consistency and trust in age assurance solutions. c. Exploring accessibility to testing data, to improve accuracy in age assurance methods. This is particularly important for methods that rely on training an algorithm, such as age estimation based on biometric data. d. Taking action within the engineering and design community to ensure that age assurance is considered as part of voluntary design codes of practice."

4. Grow public confidence in age assurance

"For age assurance to be effective it needs to be widely used. For this to happen digital parents and children need to have confidence and trust in it."

Recommendations:

"(a.) Undertaking research into how age assurance may disproportionately impact on some children and explore how these insights can be reflected in the development and implementation of age assurance. (b). Supporting digital parents to gain a better understanding of the safeguards that age assurance offers, and the compliance action taken by providers and platforms."

4.1.7 (G) Content Rating

The first step in the protection of minors on audio-visual media content is content classification. Content classification employs three primary measures used to regulate platforms (ERGA, 2017):

1. Information about content (e.g. age-ratings and content descriptions);
2. Restricting access via scheduling; and
3. Restricting access via technological mechanisms.

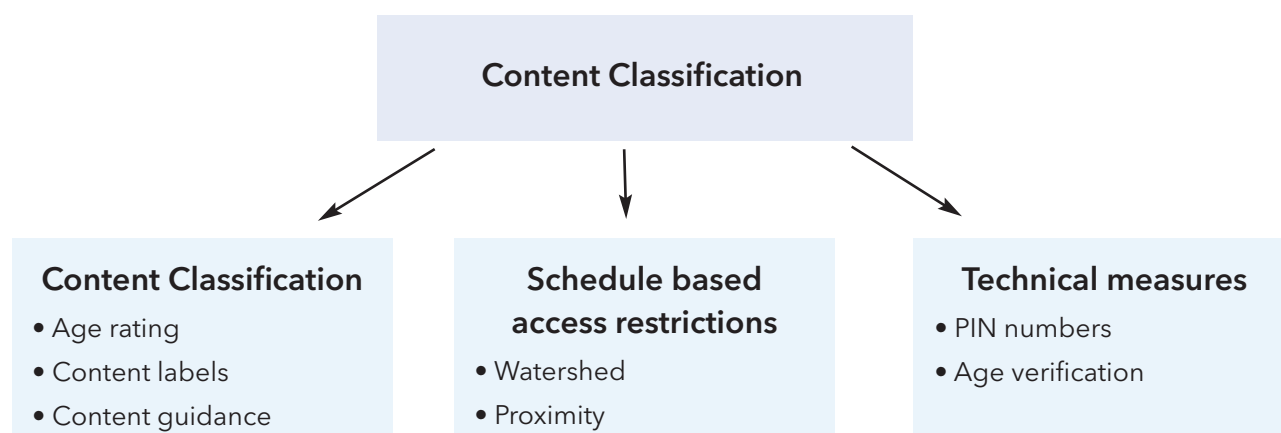


Figure 3:Media Content Classification Scheme

(ERGA, 2017, p. 7)

However, user-generated content on social media is not yet content rated. Instagram is one of the only platforms that approximates some form of intervention by blurring out videos and images and providing a warning of 'sensitive' content (Etherington, 2017). Notably, content warnings can be used as a way to restrict access to specific kinds of content; however, they are distinct features. There are nuanced differences between content warning and ratings: content classification or content detection can help inform content warnings (just like they could inform parental controls) but they are different to content warning systems. There are calls to impose independent content rating systems, such as the rating system utilised by Common Sense Media (Behind the Common Sense Media ratings system, 2020b; ERGA, 2018). Common Sense Media rates 9 content features⁷⁴ on a scale from 0-5, analyses content in terms of what subjects⁷⁵ or skills⁷⁶ they might include, and provides information to parents about what is appropriate at specific age ranges (Behind the Common Sense Media ratings system, 2020b).

The question, however, then becomes how to implement such a rating system, which would either depend on automated systems to classify material uploaded or users to self-classify content. Both approaches are currently problematic. Currently automated systems have not been developed for this type of content classification and have their own drawbacks. Alternatively, ratings by content creators or community users would mean a system that is reliant on truth and trust. Such a system would be open to manipulation by bad actors (ERGA, 2018), poses the same problems as community reporting, and arguably would allow for the exact content this system is designed to safeguard against to slip through the cracks.

4.1.8 (H) Parental Controls

Whilst greater parental controls have been made available across platforms, there is little research confirming the uptake and effectiveness of such controls in increasing safety (Blum-Ross, et al., 2018). Parental intervention includes four overlapping categories (Blum-Ross, et al., 2018): Imposing limits or restrictions when online, in terms of time, content and context; Technical (hardware and software) restrictions (e.g. filters and parental controls); Monitoring online activities either by being a part of the child's online network or tracking/supervising online activities; and Actively helping the child to navigate the online environment by having discussion or instruction.

Parents using technical restrictions are in the minority, although apps that track physical location are increasing in popularity (Blum-Ross, et al., 2018; ERGA, 2018). A small proportion of parents also use content filters or technology to reduce screen time, with greater enthusiasm for the latter, the former being seen as cumbersome for parents and easily circumvented by children (Blum-Ross, et al., 2018). Parents are often viewed as integral to children's safety online and some VSPs (TikTok, YouTube, etc.) have engaged in active development of parental control features in the last 12 months. However, there is a great need to ensure that parents are empowered across all areas of parental intervention and that controls are effective in their

⁷⁴ 'Educational Value', 'Positive Messages', 'Positive Role Models and Representations', 'Ease of Play', 'Violence', 'Sex', 'Language', 'Consumerism' and 'Drinking, Drugs & Smoking'

⁷⁵ 'Language & Reading', 'Math', 'Science', 'Social studies', 'Arts' and 'Hobbies'

⁷⁶ 'Thinking & Reasoning', 'Creativity', 'Self-direction', 'Emotional development', 'Communication', 'Collaboration', 'Responsibility & Ethics', 'Tech skills' and 'Health & Fitness'

purpose and easily adopted. Notably, in the context of the legislative landscape, TikTok recently (January, 2021) introduced new privacy features for under 18s, users will have their accounts set to private-by-default.⁷⁷ Changes are part of a wider package of measures designed to drive higher standards of user privacy and safety. Importantly, this initiative may signpost additional 'safety by design' measures that support parenting in cyber contexts and may perhaps be adopted by other VSPs.

4.1.9 (J) Digital Literacy

The European Audiovisual Observatory (EAO) mapped the media literacy projects across the EU in 2016, identifying 939 media literacy stakeholders and 547 media literacy projects. Themes identified included providing frontline support by highlighting resources (32% of projects); end user engagement (20% of projects); improving skills in critical thinking (74% of projects); and media use (70% of projects).

Parents, schools and industry are thought of as having a considerable role in supporting children's digital literacy. However, as seen in Chapter 3, parents may not be equipped with the skills themselves to be able to support children in digital literacy and schools may be lacking in the resources to universally and adequately deliver digital literacy as part of the curriculum (Blum-Ross, et al., 2018). Digital literacy programmes, therefore, have often been developed by third sector/charities, industry and by online services themselves. However, this has led to a fragmented approach, difficulties in uptake and promotion, and a lack of systematic validation of initiatives (Blum-Ross, et al., 2018). Evaluation, in instances where it has been completed, does not often go beyond surface level impact (e.g., reach or appeal), as opposed to assessing any meaningful reduction in harm or increase in digital skills (Blum-Ross, et al., 2018). Also problematic is that parents would prefer for these initiatives to be delivered through schools rather than direct from industry or online platforms (Blum-Ross, et al., 2018). Therefore, to effectively deliver digital literacy, platforms need to better promote their own training and tools (to both children and adults); more research is required to meaningfully develop and evaluate education initiatives; and schools needs to be better supported (by industry where possible) to deliver meaningful and well-integrated digital literacy programmes (Blum-Ross, et al., 2018).

This literature review identified four overlapping areas that could potentially inform Digital literacy initiatives: (i) Digital Literacy, (ii) Digital Rights, (iii) Digital Citizenship, and (iv) Advanced Media Literacy. These are described further in Table 6 below.

⁷⁷ <https://www.internetmatters.org/hub/esafety-news/tiktok-rolls-out-new-privacy-features-for-under-18s>

Table 6: Digital education areas

Digital Literacy (Common Sense Media, 2020a)	Digital Rights (5Rights Foundation, 2021)	Digital Citizenship (COE, 2020)
"the ability to effectively find, identify, evaluate, and use information."	"The UN Convention of the Rights of the Child (UNCRC) set out the conditions in which a child (under 18) might flourish - now applied online."	"The competent and positive engagement with digital technologies (creating, working, sharing, socializing, investigating, playing, communicating and learning); participating actively and responsibly (values, skills, attitudes, knowledge) in communities (local, national, global) at all levels (political, economic, social, cultural and intercultural); being involved in a double process of lifelong learning (in formal, informal and non-formal settings) and continuously defending human dignity."
Skills:	Rights:	
Searching effectively	The Right to Remove	
Protecting their and others' private information online	The Right to Know (the who, what, when and why of data use)	
Giving proper credit when using other people's work	The Right to Safety and Support	
Understanding digital footprints.	The Right to Informed and Conscious Use	
Respecting each other's ideas and opinions.	The Right to Digital Literacy	
Media Literacy: Audiovisual Media Services Directive (EU, 2018) "Media literacy' refers to skills, knowledge and understanding that allow citizens to use media effectively and safely. In order to enable citizens to access information and to use, critically assess and create media content responsibly and safely, citizens need to possess advanced media literacy skills. Media literacy should not be limited to learning about tools and technologies, but should aim to equip citizens with the critical thinking skills required to exercise judgment, analyse complex realities and recognise the difference between opinion and fact." Ofcom's working definition of media literacy (2020) Media literacy enables people to have the skills, knowledge and understanding to make full use of the opportunities presented by both traditional and new communications services. Media literacy also helps people to manage content and communications, and protect themselves and their families from the potential risks associated with using these services.⁷⁸		

⁷⁸ <https://www.ofcom.org.uk/research-and-data/media-literacy-research/media-literacy>

4.1.10 Safety-by-design

Safety-by-design proposals are a fundamental approach to preventing exposure to harmful content. Two examples of safety-by-design proposals have been identified whereby there are additional measures that online platforms could adopt to ensure a safer online environment for children. They are as follows (1) The ICT Coalition for Children Online and (2) Information Commissioners Office (ICO) Age-Appropriate Design Code.

1. The ICT Coalition for Children Online (an organisation that aims to “help younger Internet users across Europe to make the most of the online world and deal with any potential challenges and risks”) which is made up of 20 companies across the ICT sector, including VSP platforms such as TikTok, Facebook and Twitter (ICT Coalition, 2020). The ICT Coalition for Children Online has set forth six key principles to keeping children safe online (ICT Coalition, 2020), outlined in the textbox below.

The ICT Coalition’s 6 key principles to keeping children safe online:

Principle 1: Content. Platforms and services should ensure that only content appropriate for children and young people is seen by children and young people.

Principle 2: Parental Controls. Platforms and services should assist parents in being able to limit children’s exposure to inappropriate content and contact.

Principle 3: Dealing with abuse/misuse. Platforms and services should have adequate response mechanisms in place to deal with content or conduct that is illegal, harmful, offensive or inappropriate.

Principle 4: Child abuse or illegal contact. Platforms and services should ensure that such identified content or contact is reported to law enforcement, co-operate with law enforcement in the investigation of CSAM/CSE, remove CSAM and provide information to users about reporting of CSAM.

Principle 5: Privacy and Control. Platforms and services should comply with data protection and privacy regulation, as well as privacy rights.

Principle 6: Education and Awareness. Platforms and services should further educate users about safer internet use.

Source: <http://www.ictcoalition.eu>

2. Information Commissioners Office (ICO) Age-Appropriate Design Code. As this code was enacted on 12th August 2020, all relevant services in scope will need to ensure compliance by 2nd September 2021 (ICO, 2019). The ICO Age-Appropriate design code contains 15 standards, as outlined in the text box below.

There are apparent similarities between the AVMSD and the two safety-by-design proposals. However, whilst the regimes may seem similar, the ICO regime considers the role of data protection and privacy in relation to user harm, while the VSP regime specifies companies to protect users from specific harms through a range of measures.

A key area covered in greater detail by ICO’s Age Appropriate Design Code is the collection and processing of children’s data by online services, not exclusively to services aimed at children but certainly in relation to services that are likely to be accessed by children (ICO, 2019): “This code addresses how to design data protection safeguards into online services to ensure they are appropriate for use by, and meet the development needs of, children” (ICO, 2019, p. 9). Notably the code states “there is no requirement for you to design services for development stages that aren’t likely to access your service” (ICO, 2019, p. 33).

Outline of the 15 standards of The ICO Age Appropriate design code:

- 1. Best interests of the child:** To be at the forefront of design and development of online services used by children.
- 2. Data protection impact assessments (DPIA):** To assess and mitigate risks, arising from data processing, to rights and freedoms of children. DPIA must account for difference ages, capacities and developmental needs.
- 3. Age appropriate application**:** Either establish the age of users (in a way that is not in conflict with DPIA) or apply standards of the code to all users.
- 4. Transparency**:** Information to users on privacy information must be concise, prominent and in clear language. Additional information about use of personal information should be provided when in use.
- 5. Detrimental use of data:** Children's personal data cannot be use when it is detrimental to their wellbeing or goes against codes of practice and other regulatory standards.
- 6. Policies and community standards:** Published terms, policies and community standards need to be upheld (including, but not limited to, privacy policies, age restriction, behaviour rules and content policies).
- 7. Default settings:** Settings must be 'high privacy' by default*.
- 8. Data minimisation:** The minimum amount of a child's personal data should be collected and retained in order to provide the service the child is actively engaged in. Children should be given the option to activate individual elements.
- 9. Data sharing:** Children's data should not be shared*.
- 10. Geolocation:** Geolocation should be off by default*; if turned on must sign tracking is active and revert to off at the end of the session.
- 11. Parental Controls**:** Age appropriate information must be given about controls and must signify to the child if their activities are being monitored or tracked.
- 12. Profiling:** Profiling should be off by default* and only permitted if there is protection against harmful effects of profiling.
- 13. Nudge techniques**:** Nudge techniques should not be used to gather personal data or weakening privacy protections.
- 14. Connected toys and devices:** Connected toys and devices should also be in compliance.
- 15. Online tools**:** Tools should be prominent and accessible to assist child in exercising their rights and being able to report concerns.

** Unless a compelling reason is demonstrated, and best interests of the child are taken into account*

*** Further information is given relating to specific age ranges*

Source: <https://ico.org.uk/for-organisations/guide-to-data-protection/key-data-protection-themes/age-appropriate-design-a-code-of-practice-for-online-services>

4.2 Towards a comprehensive VSP safety strategy for minors

4.2.1 A Safety Tech Taxonomy: Levels of solutions

Donaldson, Davidson and Aiken (Safer technology, safer users: The UK as a world-leader in Safety Tech, 2020) recently conducted research to provide “an overview of the UK’s Safety Technology (“Safety Tech”) sector, including its market growth and potential” and highlighting “some of the UK’s most innovative businesses focused on tackling online harms through a range of technical solutions” (Donaldson, Davidson, & Aiken, 2020, p. 7).

“The technology and services that these organisations provide are valuable to government and society. They help law enforcement and platforms to identify and stop some of the most serious illegal content such as child sexual exploitation and abuse (CSEA) and terrorist imagery and material. The technologies and services work to reduce the risk of users, including children, being exposed to harmful content, contact or conduct such as grooming, bullying, radicalisation and/or viewing self-harm material. They also help to tackle disinformation, and false or misleading narratives.” (Donaldson, Davidson, & Aiken, 2020, p. 8)

From this research, Donaldson et al. (2020) devised a Safety Tech Taxonomy, outlining the levels of governance and at what level the interventions ought to be implemented, as well as identifying active and successful organisations in the relevant areas (outlined in Table 7 below). Whilst this is not an exhaustive list of the UK online safety technology sector, it is nonetheless useful in terms of illustrating technology solutions to tech facilitated harmful or problematic material. This taxonomy could arguably inform the foundation of the safety of any VSP or social media platform. By identifying the relevant organisations in this area, services can build in house capabilities or potentially outsource to online safety technology service providers where they lack the capacity to meet their regulatory requirements.

4.2.2 U.K. Safety Tech Taxonomy

Table 7: U.K. Safety Tech Taxonomy

Intervention	Example U.K. Organisations
System Wide Level Factors	
Tracing, locating and removing illegal content	IWF, QUMODO, CYAN FORENSICS
Platform Level Factors	
Platform response (e.g. T&Cs) to preventing and removing illegal content	DRAGONFLAI
Prevention, detection and action against harmful and illegal content	CRISP, SPIRIT AI
Age appropriate design	SUPERAWESOME
Age of independent Internet use/Age Verification	YOTI, TRUSTELEVATE
Endpoint level factors	
User initiated protection (by user, parent or device)	SAFETONET
Content rating, filtering and monitoring	SMOOTHWALL, HAANDLE LTD
Information Environment Level Factors	
Detecting and disrupting false, misleading and/or harmful narratives	FULL FACT, FACTMATA, LOGICALLY
Other	
Compliance & professional services	ISLAND23

4.2.3 A cautionary note on technological solutions to removing harmful content

Automated, Artificial Intelligence (AI) and Machine Learning (ML) tools are essential in tackling harmful or illegal content at scale and within the time windows mandated for takedown, which is necessary to moderate mega-platforms such as Facebook (Donaldson, Davidson, & Aiken, 2020; Gorwa, Binns, & Katzenbach, 2020).

To illustrate the scale, consider, as a case study, the terrorist attack in Christchurch New Zealand. The Facebook Live Stream video of the attack was seen by a handful of users, quickly reported and quickly taken down. However, within hours, the video was reuploaded to multiple platforms by hundreds of thousands of users. Facebook representatives report that within 24 hours there were 1.5 million attempts to reupload the video on Facebook alone, with 80% being automatically blocked before upload (Gorwa, Binns, & Katzenbach, 2020; Sonderby, 2019). Notably, on a daily basis, content-hosting platforms process 2 billion uploads (THORN, 2020).

However, despite the growing necessity, technological solutions have introduced many contentious issues. Reliance on these systems creates concern as they are poorly understood, can lack transparency, and create grey areas in accountability (Gorwa, Binns, & Katzenbach, 2020). Specifically, technological solutions can be problematic in that they may:

- “(a) decrease decisional transparency (making a famously non-transparent set of practices even more difficult to understand or audit);
- (b) complicate outstanding issues of justice (how certain viewpoints, groups, or types of speech are privileged); and,
- (c) obscure or depoliticise the complex politics that underlie the practices of contemporary platform moderation” (Gorwa, Binns, & Katzenbach, 2020, p. 3).

There are however fundamental problems in terms of expectation and design. There is an unrealistic, at least for now, expectation that technological solutions can approximate the accuracy and nuance of human decision making (Gollatz, Beer, & Katzenbach, 2018) and, furthermore, can do so in real time (ERGA, 2018). Technological solutions are not neutral, they are only as good as their designers and the quality of data on which they are designed and tested – in some instances creating their own problems such as undue censorship, infringement on rights, and biases against ethnic minorities and non-English speakers (Donaldson, Davidson, & Aiken, 2020; Gollatz, Beer, & Katzenbach, 2018). Adoption of automated solutions to implement the requirements under the VSP regime, should be undertaken with careful consideration of the above issues and with the recognition that automated systems may in some cases increase the burden of human moderation (e.g., false positives) (Jhaver, Birman, Gilbert, & Bruckman, 2019).

4.2.4 Sharing across platforms

Notably, the VSP framework only applies to audiovisual content shared on social media services within UK jurisdiction; other services may meet the legal definition but will fall under EU jurisdiction. A challenge will therefore be to address sharing across platforms; something that may be restricted by a UK regulated platform may still be available to UK users on another service in a different jurisdiction subject to other rules. Additionally, special consideration should be given to a broader range of social technologies, for example, search engines such as Google, Bing, and Yahoo, which facilitate user access.

Online risks and harms must be conceptualised as a 'big data' problem. The sheer volume, velocity and variety of content will require AI and ML solutions, which is why the research team propose incorporating 'Safety Tech' solutions into the proposed frameworks solutions approach, to take account of a broader range of non-VSP services used by minors. For example, the implementation of parental controls and network filtering solutions, or whereby AI monitored software solutions to text-based cyberbullying could be deployed. This research report includes recommendations regarding further research that is currently beyond the scope and limitations of the present call for proposals, highlighted in the following Chapter 5 under recommendations and implications for further research.

Chapter 5. Recommendations and implications for further research

In reviewing the literature in this area, as presented in Chapters 1-4, numerous issues were identified by the UEL research team that were beyond the original scope of this work. For the benefit of future research and policy making, we share them here under a general commentary on research design in the field. Additionally, future directions are recommended along with implications for further research in relation to VSPs, social media and other online platforms. We consider our recommendations to be relevant to a wide range of stakeholders, individuals and organisations, including the research community, academics, psychologists, industry and regulators.

A) General commentary on research design that currently limits policy decisions from empirical research:

1. Much research in this field still looks, very broadly, at 'screen-time,' 'digital devices,' 'social media' or the 'Internet' or 'going online' generally. Superficial measures of 'being online' limits the ability of empirical research to link specific online activities or factors to physical, moral and mental outcomes. More research is needed that specifically looks at types of engagement or 'pathways to risk and/or harm' on image and video-sharing platforms, as well as the unique features of VSP platforms to discern what activities and features are most likely to result in benefits, risk, harms and solutions.
2. Currently many studies in the area do not go beyond descriptive statistics. Adoption of alternative research methods will enable researchers to make conclusions regarding causation, for example, longitudinal (rather cross sectional) studies, advanced statistical analysis or modelling of empirical data, or quasi-experimental research designs.
3. Furthermore these studies should aim to include all interconnected factors that may influence the relationship between experience/risk and harm (including but not limited to: age, gender, sexual orientation, baseline mental health, psychological vulnerability, social isolation/connectedness, amount of time spent on devices/online, platforms/sites used, familial, environmental and socio-economic factors, online activities and so forth), to move towards determining the predictive power of individual and combined variables.
4. Sampling decisions are also a factor that currently limit the conclusions of research in the area, large scale studies could aim to recruit inclusive samples representative of larger or national populations (e.g. atypical neurological development, mental health conditions, a wide range of age ranges from birth to adulthood, important demographic variables and so forth) additionally smaller scale studies could focus on groups disproportionately affected by harms (as identified by large scale studies). Additionally, much of the research has been conducted in the Global North and there is a paucity of funding for research in the Global South.
5. The advancement of theories of child development in the context of cyber environments, driven by empirical research and findings, could potentially identify key mechanisms that mediate the relationship between online risks and online harms (e.g., similar to 'resilience' as a mediating factor between trauma and negative outcomes). Therefore, investigation and advancement of 'child cyberdevelopmental theory' should inform the future research agenda.

6. An evidence-based framework of cyberpsychological development should be investigated, mirroring foundational real-world developmental psychology theories and exploring how age categorisation could operate in the context of frameworks of benefits, risk and harms. This, in turn, would lead to an empirically justifiable framework of age bands in relation to technology in general. Such research could inform evidence-based recommendations for best practice technology use throughout early childhood.

B) Implications for further research in relation to VSPs, social media and other online platforms:

7. Further research concerning the potential benefits of VSPs, social media and other online platforms should be undertaken. For example, some VSPs are starting to proactively use the platforms for good, such as providing education and information from trusted sources, access to health advice and support. While this should be encouraged, it is vital that it is done in the right way. Practical ways in which VSPs can be harnessed for the good of children and young people's education, learning and health, should be explored further and broadly opportunities for benefits should be considered.
8. Further research should continue to investigate risks and harms as identified within this report (perhaps through the triangulation of various research methods to substantiate conclusions from individual studies) but new and emerging behaviours need to also be considered. For example, more research needs to be undertaken on the specific risks/harms included in the relatively new broad harm of 'cyber deviance' e.g., identity theft, hacking, cyberscams/cyberfraud, malware/spyware – there is recent emerging research that these may be harmful to children and young people both in terms of offending and victimology.
9. A cohesive approach to the development and evaluation of social solutions. Robust evaluation programmes are needed to validate digital literacy programmes and self-assessment metrics as a first step. Next, social solutions need to be evaluated to either ensure a meaningful reduction in risk or harm, or a meaningfully increase in digital knowledge or skills. Research involving social solutions should aim to include industry, academics, professionals from the education sector, parents/caregivers, and children/young people as co-creators. This will facilitate up-take in the targeted population, ensure education initiatives are well-integrated with current education programmes and be appropriately tailored to the intended audiences.
10. Further research is needed to evaluate the efficacy of solutions in relation to the 10 AVMSD measures, as discussed in Chapter 4 arguably there are currently no optimal solutions to satisfy these requirements. In the absence of optimal solutions, further research is needed to fine tune current working solutions, requiring comprehensive and carefully considered research to accurately identify and weigh the pros, cons and unknowns of suboptimal solutions. As demonstrated in chapter 4 current solutions may be prone to unintended consequences, therefore research should also investigate the efficacy of a risk assessment-based approach
11. The coronavirus pandemic and national lockdowns have seen more young people using VSPs, social media and online platforms both positively and negatively. For example, young people have used VSPs and other forms of online media to help them stay connected with friends and family, do schoolwork, find information, have fun, keep busy and be entertained. However, during this time there has also been a reported surge in online child sexual abuse, coercion and exploitation. Urgent research needs to be conducted to investigate the reported increases in harm during the pandemic and what features of VSPs may enable or mitigate harm

12. Given the speed with which young people's use of VSPs, social media and online platforms evolves, and the ever-changing nature and scope of platforms available there is a need for an iterative approach to ensure that any VSP guidance remains up to date and evidence based. Equally there is a need to ensure that the underpinning evidence is of good quality, represents current cyber environments, and importantly how users operate and engage within these environments.

References

5Rights Foundation. (2020). The 5Rights Framework. Retrieved 10 16, 2020, from <https://5rightsfoundation.com/about-us/the-5-rights/>

AAP. (2019, December 12). Digital guidelines: Promoting healthy technology use for children. Retrieved November 17, 2020, from American Psychological Association: <https://www.apa.org/topics/healthy-technology-use-children>

Aiken, M. (2016) *The cyber effect: A pioneering cyber-psychologist explains how human behavior changes online*. New York: Spiegel & Grau.

Aiken, M., Davidson, J., & Amann, P. (2016). *Youth Pathways into Cybercrime*. London: Paladin Capital Group.

Akdemir, N., Sungur, B., & Başaranel, B. U. (2020) Examining the Challenges of Policing Economic Cyber-crime in the UK. *Güvenlik Bilimleri Dergisi (International Security Congress Special Issue), Özel Sayı*, 111-132.

All Party Parliamentary Group (APPG) on Social Media (2019). #NewFilters to manage the impact of social media on young people's mental health and wellbeing. Available at: <https://www.rsph.org.uk/our-work/policy/wellbeing/new-filters.html>

Altman, N., Krzywinski, M. (2015). Association, correlation and causation. *Nat Methods* 12, 899-900 <https://doi.org/10.1038/nmeth.3587>

Anderson, E., Steen E. and 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.

Anderson, D. R. and Subrahmanyam, K. (2017). Digital screen media and cognitive development. *Paediatrics*, 140(Supplement 2), S57-S61.

Anderson, M. and Jiang, J. (2018). *Teens, Social Media and Technology*. Pew Research Centre. Available at: <https://www.pewresearch.org/internet/2018/05/31/teens-social-media-technology-2018/>

Anstead, A. (2017) *Dealing with hate crime*. EU: European Network Against Racism. Available at: <https://www.ukren.org/uploads/Dealing%20with%20hate%20crime.pdf>

Appel, H., Gerlach, A. L. and Crusius, J. (2016). The interplay between Facebook use, social comparison, envy, and depression. *Current Opinion in Psychology*, 9, 44-49.

ASA. (2018, September 28). An Influencer's Guide to making clear that ads are ads.

Retrieved October 21, 2020, from

<https://www.asa.org.uk/uploads/assets/uploaded/3af39c72-76e1-4a59-b2b47e81a034cd1d.pdf>

Asare, M. (2015). Sedentary behaviour and mental health in children and adolescents: A Meta-analysis.

Journal of Child and Adolescent Behaviour, 3(06). Audley Villages (2020). Most popular quarantine

activities. Available at:

<https://www.audleyvillages.co.uk/most-popular-quarantine-activities>

Awan, I. (2016) 'Islamophobia on Social Media: A Qualitative Analysis of the Facebook's Walls of Hate',

International Journal of Cyber Criminology, 10 (1), pp. 1-20.

Bachmann, C., Goode, B. (2017) *LGBT in Britain - Hate Crime and Discrimination*. London: Stonewall.

Available at: https://www.stonewall.org.uk/sites/default/files/lgbt_in_britain_hate_crime.pdf.

Baltes, P. B. (1987). Theoretical propositions of life-span developmental psychology: On the dynamics between growth and decline. *Developmental psychology*, 23(5), 611-626.

Bardin, J. (2012). Unlocking the brain. *Nature*, 487(7405), 24-26.

Barn, R, & Barn, B. (2016). An ontological representation of a taxonomy for cybercrime. Istanbul, Turkey:

24th European Conference on Information Systems (ECIS 2016), 12-15 June 2016.

Barnardo's (2016) Barnardo's survey of Online Grooming [Online]. Available:

<https://www.barnardos.org.uk/barnardos-online-grooming-survey-2016.pdf>

BBC. (2018, October 3). Pre-schoolers are watching more online video, says study. Retrieved October 22,

2020, from BBC News: <https://www.bbc.co.uk/news/technology-45738280>

Best, P., Manktelow, R. and Taylor, B. J. (2016). Social Work and Social Media: Online Help-Seeking and the Mental Well-Being of Adolescent Males. *British Journal of Social Work*, 46(1), 257-276.

<https://doi.org/10.1093/bjsw/bcu130>

Black, A., Lumsden, K. & Hadlington, L. (2019). 'Why Don't You Block Them?' Police Officers' Constructions of the Ideal Victim When Responding to Reports of Interpersonal Cybercrime. In K.

Blakemore, S.-J. and Mills, K. L. (2014). Is Adolescence a Sensitive Period for Sociocultural Processing?

Annual Review of Psychology, 65, 9.1-9.21.

Blum-Ross, A., Livingstone, S. (2017). Sharenting: parent blogging and the boundaries of the digital self.

Popular Communication, 15(2), 110-125.

Blum-Ross, A., Donoso, V., Dinh, T., Mascheroni, G., O'Neill, B., Riesmeyer, C. & Stoilova, M. (2018). Looking forward: Technological and social change in the lives of European children and young people. Report for the ICT Coalition for Children Online. Brussels: ICT Coalition. *BMJ Open* 2015;5:e006748. doi: 10.1136/bmjopen-2014-006748

Borghese M., Tremblay, M. and Katzmarzyk, P. (2015) Mediating role of television time, diet patterns, physical activity and sleep duration in the association between television in the bedroom and adiposity in 10 year-old children. *Int J Behav Nutr Phys Act*, 12:60-70

BPS. (2020). Developmental Psychology Section. Retrieved November 12, 2020, from The British Psychological Society:
<https://www.bps.org.uk/member-microsites/developmental-psychology-section>

Brenner, S. (2007). Cybercrime: Re-thinking crime control strategies. In Y. Jewkes (Ed.), *Crime online* (pp. 12-28). Cullompton, United Kingdom: Willan Publishing.

Bretherton, I. (1992). The Origins of Attachment Theory: John Bowlby and Mary Ainsworth. *Developmental Psychology*, 28(5), 759-775.

Broadhead, S. (2018). The contemporary cybercrime ecosystem: A multi-disciplinary overview of the state of affairs and developments. *Computer Law & Security Review*, 34(6), 1180-1196.

Bronfenbrenner, U. (1979). *The ecology of human development*. Cambridge, Massachusetts: Harvard University Press.

Brown, S. (2020). Caught in the Net. *Therapy Today*, February 2020 Volume 31 Issue 1.

Burns, S. & Roberts, L. (2013). Applying the theory of planned behaviour to predicting online safety behaviour. *Crime Prevention and Community Safety*, 15(1), 48-64.

Butler, M. (2018). Is Internet Use Increasing Loneliness for Young People? Institute for Family Studies. Available at:
<https://ifstudies.org/blog/is-pornography-use-increasing-loneliness-particularly-for-young-people>

Campbell, J. and Twenge, W. (2018) Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. *Preventive Medicine Reports*, 12:271-283.

Carson, V., Hunter, S. and Kuzik, N. (2016) Systematic review of sedentary behaviour and health indicators in school-aged children and youth: an update. *Applied Physiology, Nutrition, and Metabolism*.

Carter, B., Rees, P., Hale, L., Bhattacharjee, D. and Paradkar, M. S. (2016). Association Between Portable Screen-Based Media Device Access or Use and Sleep Outcomes: A Systematic Review and Meta-analysis. *JAMA pediatrics*, 170(12), 1202-1208. <https://doi.org/10.1001/jamapediatrics.2016.2341>

CARU. (2020). The Children's Advertising Review Unit (CARU). Retrieved 10 15, 2020, from <https://bbbprograms.org/programs/all-programs/caru>

Centre for Cyber Safety and Education (2019). Children's Internet Usage. Available at: <https://isc2center.my.salesforce.com/sfc/p/#G0000000iVSt/a/0f000000fyoc/TYQ9XvDATBA78rR00G.PGJ9fmaLm1vQfAW9HCpy3GWk>

Centre for Mental Health (2018). Briefing 53: Social Media, young people and mental health. Available: <https://www.centreformentalhealth.org.uk/publications/social-media-young-people-and-mental-health>

Chang, L. Y. (2012). Cybercrime in the Greater China Region: Regulatory responses and crime prevention across the Taiwan Strait. Cheltenham: Edward Elgar Publishing.

Chassiakos, Y., Radesky, J., Christakis, D., Moreno, M. and Cross, C. (2016). Children and adolescents and digital media. Council on communications and media. Pediatrics, 138 (5).

Cheng, Y.S., Tseng, P.T., Lin, P.Y., Chen, T.Y., Stubbs, B., Carvalho, A.F., Wu, C.K., Chen, Y.W. and Wu M.K. (2018). Internet Addiction and Its Relationship With Suicidal Behaviors: A Meta-Analysis of Multinational Observational Studies. J Clin Psychiatry. 5;79(4). doi: 10.4088/JCP.17r11761. PMID: 29877640.

Cheung, C. H., Bedford, R., Saez De Urabain, I. R. & Karmiloff-Smith, A. (2017). Daily touchscreen use in infants and toddlers is associated with reduced sleep and delayed sleep onset. Scientific Reports, 7, article 46104.

Children's Commissioner (2018). Life in 'Likes'. Available at: <https://www.childrenscommissioner.gov.uk/publication/life-in-likes/>.

Clarke, B., and Crowther, K. (2015). Children internet safety report: Key findings. Family Kids and Youth, Technknowledge for schools.

CMA. (2019). Social media endorsements: being transparent with your followers. Retrieved October 21, 2020, from <https://www.gov.uk/government/publications/social-media-endorsements-guide-for-influencers/social-media-endorsements-being-transparent-with-your-followers>

COE. (2020). Digital Citizenship and Digital Citizenship Education. Retrieved 10 16, 2020, from <https://www.coe.int/en/web/digital-citizenship-education/digital-citizenship-and-digital-citizenship-education>

Commission of the European Communities. (2007). Communication from the commission to the European Parliament, the council and the committee of the regions: Towards a general policy on the fight against cyber crime. COM(2007), 267, 1-10.

Commission on Fake News and the Teaching of Critical Literacy Skills in Schools (2018). Fake news and critical literacy. Available at: <https://literacytrust.org.uk/research-services/research-reports/fake-news-and-critical-literacy-final-report/>

Common sense media (2015). The Common Sense Census: Media Use by Tweens and Teens [Online]. Available: <https://www.commonsensemedia.org/research/the-common-sense-census-media-use-by-tweens-and-teens>

Common Sense Media. (2020a). News and Media Literacy. Retrieved 10 16, 2020, from <https://www.commonsensemedia.org/news-and-media-literacy/what-is-digital-literacy>

Common Sense Media. (2020b). Behind the Common Sense Media ratings system. Retrieved 10 16, 2020, from <https://www.commonsensemedia.org/about-us/our-mission/about-our-ratings>

Cooney, A. (2019). The digital age of consent, one year on. Retrieved 10 16, 2020, from <https://blogs.lse.ac.uk/medialse/2019/05/23/the-digital-age-of-consent-one-year-on/>

Council of Europe . (2001). Convention on cybercrime. European Treaty Series, No. 185, 1-25.

Council of Europe. (2003). Additional protocol to the convention on cybercrime, concerning the criminalization of acts of a racist and xenophobic nature committed through computer systems. Strasbourg: Council of Europe.

Crawford, K., & Gillespie, T. (2016). What is a flag for? Social media reporting tools and the vocabulary of complaint. *New Media & Society*, 18(3), 410-428.

Cyberpsychology: Journal of Psychosocial Research on Cyberspace, 10(2), Article 6.

Dahl, R. E. (2001). Affect regulation, brain development, and behavioral/emotional health in adolescence. *CNS Spectrums*, 6, 60-72.

Danovitch, J. H. (2019). Growing up with Google: How children's understanding and use of internet-based devices relates to cognitive development. *Human Behavior & Emerging Technologies*, 1, 81-90. 10.1002/hbe2.142, 1, 2, (81-90).

Davidson, J., DeMarco, J., Bifulco, A., Bogaerts, S., Vincenzo, C., Aiken, M., et al. (2016). Enhancing police and industry practice: EU Child Online safety project. London. Retrieved from www.mdx.ac.uk/__data/assets/pdf_file/0033/248469/EU_Child_Online_Safety_Project.pdf.

Davidson, J., Livingstone, S., Jenkins, S., Gekoski, A., Choak, C., Ike, T., & Phillips, K. (2019). Adult Online Hate, Harassment and Abuse: A Rapid Evidence Assessment. London: Department for Digital, Culture, Media and Sport (DCMS).

Department for Digital, Culture, Media and Sport, Home Office (2019) Online Harms White Paper [Online]. Available: <https://www.gov.uk/government/consultations/online-harms-white-paper>

Department for Education (2019) Relationships Education and Relationships and Sex Education (RSE) and Health Education [Online]. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/781150/Draft_guidance_Relationships_Education__Relationships_and_Sex_Education__RSE__and_Health_Education2.pdf

Ditch the Label (2018) Cyberbullying Statistics: What They Tell Us - Ditch the Label [Online]. Available: <https://www.ditchthelabel.org/cyber-bullying-statistics-what-they-tell-us/>

Donalds, C. and Osei-Bryson, K. M. (2019). Toward a cybercrime classification ontology: A knowledge-based approach. *Computers in Human Behavior*, 92, 403-418.

Donaldson, S., Davidson, J., & Aiken, M. (2020). Safer technology, safer users: The UK as a world-leader in Safety Tech. London: DCMS.

Dong, G. and Potenza, M. (2015). Behavioural and brain responses related to Internet search and memory. *European Journal of Neuroscience* 42(8)

Dresp-Langley, B. (2020). Children's Health in the Digital Age. *International Journal of Environmental Research and Public Health*, 17(9), 3240-3264.

Dubin, A. (2014, October 18). Have a social media account for your baby? 40 percent of millennial moms do. Retrieved November 13, 2020

Dyson, M. P., Hartling, L., Shulhan, J., Chisholm, A., Milne, A., Sundar, P., Scott, S. D. and Newton, A. S. (2016). A Systematic Review of Social Media Use to Discuss and View Deliberate Self-Harm Acts. *PloS one*, 11(5), e0155813. <https://doi.org/10.1371/journal.pone.0155813>

EAO. (2016). Mapping of media literacy practices and actions in EU-28. Strasbourg: European Audiovisual Observatory.

Edwards, S., Nolan, A., Henderson, M., Mantilla, A., Plowman, L. & Skouteris, H. (2016). Young children's everyday concepts of the inter-net: A platform for cyber-safety education in the early years. *British Journal of Educational Technology*, 49(1), 45-55.

Elias, N. & Sulkin, I. (2017). YouTube viewers in diapers: An exploration of factors associated with amount of toddlers' online viewing. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, 11(3), article 2.

ERGA. (2017). Protection of Minors in the Audiovisual Media Services: Trends & Practices. Retrieved October 10, 2020, from <https://erga-online.eu/wp-content/uploads/2016/10/ERGA-PoM-Report-2017-word-press.pdf>

ERGA. (2018). ERGA Academy 2018 Workshop Protecting Children in Audiovisual Media Services - The effectiveness of age verification and media literacy (Activity Report). ERGA.

Etherington, D. (2017). Instagram begins blurring some sensitive content, opens two-factor to all. Retrieved 10 16, 2020, from <https://techcrunch.com/2017/03/23/instagram-begins-blurring-some-sensitive-content-opens-two-factor-to-all/>

EU. (2018, November 14). Revision of the Audiovisual Media Services Directive (AVMSD). Retrieved 10 16, 2020, from <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L1808&from=EN>

European Commission. (2013, February 7). Cybersecurity strategy of the European Union: An open, safe and secure cyberspace. Retrieved July 8, 2020, from www.eeas.europa.eu/archives/docs/policies/eu-cyber-security/cybsec_comm_en.pdf.

European Commission. (2018, November 14). Directive (EU) 2018/1808 of the European Parliament and of the Council of 14 November 2018 amending Directive 2010/13/EU on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the provis. Retrieved October 21, 2020, from <https://eur-lex.europa.eu/eli/dir/2018/1808/oj>

European Union. (2013). Directive 2013/40/EU of the European Parliament and of the Council of 12 August 2013 on attacks against information systems and replacing Council Framework Decision 2005/222/JHA. Official Journal of the European Union, 218, 8-14.

EUROPOL (2020). Exploiting Isolation: Offenders and victims of online child sexual abuse during the COVID-19 pandemic. Available at: file:///C:/Users/annag/Downloads/europol_covid_report-cse_jun2020v.3_0.pdf

EUROPOL. (2020a). Pandemic profiteering: how criminals exploit the COVID-19 crisis. The Hague: European Union Agency for Law Enforcement Cooperation.

EUROPOL. (2020b). Exploiting Isolation: Offenders and victims of online child sexual abuse during the COVID-19 pandemic. The Hague: European Union Agency for Law Enforcement Cooperation.

Firth, J., Torous, J., Stubbs, B., Firth, J.A., Steiner, G.Z., Smith, L., Alvarez-Jimenez, M., Gleeson, J., Vancampfort, D., Armitage, C.J. and Sarris, J. The "online brain": how the Internet may be changing our cognition. *World Psychiatry*. 2019 Jun;18(2):119-129. doi: 10.1002/wps.20617. PMID: 31059635; PMCID: PMC6502424.

Freed, R. and Owenz, M. (24 October, 2018). How the Tech Industry Uses Psychology to Hook Children. Why do kids struggle to look up from devices? The answer is persuasive design. *Psychology Today*. Available at: <https://www.psychologytoday.com/us/blog/mental-wealth/201810/how-the-tech-industry-uses-psychology-hook-children>

Furnell, S. M. (2002). *Cybercrime: Vandalizing the information society*. London: Addison Wesley.

Gillespie, A. A. (2015). *Cybercrime: Key Issues and Debates*. New York: Routledge.

Gillespie, T. (2018). *Custodians of the Internet. Platforms, content moderation, and the hidden decisions that shape social media*. New Haven & London: Yale University Press.

Girlguiding (2016). *Girls' Attitudes Survey*. Available at: <https://www.girlguiding.org.uk/globalassets/docs-and-resources/research-and-campaigns/girls-attitudes-survey-2016.pdf>

Globokar, R. (2018). Impact of digital media on emotional, social and moral development of children. *Nova prisutnost* 16 (2018) 3, 545-560

Gollatz, K., Beer, F. & Katzenbach, C. (2018). The Turn to Artificial Intelligence in Governing Communication Online. SSOAR.

Gordon, S. and Ford, R. (2006). On the definition and classification of cybercrime. *Journal in Computer Virology*, 2(1), 13-20.

Gorwa, R., Binns, R. & Katzenbach, C. (2020). Algorithmic content moderation: Technical and political challenges in the automation of platform governance. *Big Data & Society*, 1-15.

Grant, M. J. & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information and Libraries Journal*, 26, 91-108.

Green, A., Wilkins, C., Wyld, G. & Manning, C. (2019). *Keeping Children Safe Online*. London: NPC, Nominet & ParentZone.

Gregory, C. (2019). Internet Addiction Disorder. PSYCOM. Available at: <https://www.psychom.net/iadcriteria.html>

Griffin, C., Gavin, J. and Szmigin, I. (2018). All night long: Social media marketing to young people by alcohol brands and venues. Available at: <https://alcoholchange.org.uk/publication/all-night-long-social-media-marketing-to-young-people-by-alcohol-brands-and-venues>

Grygiel, J. and Brown, N. (2019). Are social media companies motivated to be good corporate T citizens? Examination of the connection between corporate social responsibility and social media safety. *Telecommunications Policy*, 43(5), 445-460.

Hall, G. S. (1904). *Adolescence: Its psychology and its relation to physiology, anthropology, sociology, sex, crime, religion, and education* (Vols. I & II). Englewood Cliffs, NJ: Prentice-Hall.

Hamm, MP., Newton AS. and Chisholm, A. (2015) Prevalence and Effect of Cyberbullying on Children and Young People: A Scoping Review of Social Media Studies. *JAMA Pediatr*, 169(8):770-7

Harlow, H. F. (1959). Love in infant monkeys. *Scientific American*, 200(6), 68-75.

Harris Poll. (2018). Beyond Millennials: The Next Generation of Learners. Available at: https://www.pearson.com/content/dam/one-dot-com/one-dot-com/global/Files/news/news-announcements/2018/The-Next-Generation-of-Learners_final.pdf

Harris, J. (2020). Is TikTok the new wellness platform? Stylist. Available at: <https://www.stylist.co.uk/fitness-health/tiktok-new-wellness-fitness-platform/395346>

Hendriks, H., Wilmsen, D., van Dalen W. and Gebhardt, WA. (2020). Picture Me Drinking: Alcohol-Related Posts by Instagram Influencers Popular Among Adolescents and Young Adults. *Frontiers in Psychology*, 10, 2991. Available at: <https://www.frontiersin.org/article/10.3389/fpsyg.2019.02991>

Hensch, T. K. (2005). Critical period plasticity in local cortical circuits. *Nature Reviews Neuroscience*, 6(11), 877-888.

Hinchliffe, T. (2019). Teens on TikTok: do the benefits outweigh the risks? *The Sociable*. Available at: <https://sociable.co/social-media/teens-on-tiktok-do-the-benefits-outweigh-the-risks/>

HM Government (2017) Internet Safety Strategy – Green Paper [Online]. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/650949/Internet_Safety_Strategy_green_paper.pdf

HM Government (2019) Online Harms White Paper [Online]. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/793360/Online_Harms_White_Paper.pdf

HMICFRS (2018) Understanding the difference the initial police response to hate crime. London: HMICFRS. Available at: <https://www.justiceinspectorates.gov.uk/hmicfrs/wp-content/uploads/understanding-the-difference-the-initial-police-response-to-hate-crime.pdf>.

Hoare, E., Milton, K., Foster, C. et al (2016) The associations between sedentary behaviour and mental health among adolescents: a systematic review. *Int J Behav Nutr Phys Act* 13, 108
<https://doi.org/10.1186/s12966-016-0432-4>

House of Commons Science and Technology Committee (2019) Impact of social media and screen-use on young people's health [Online]. Available at: <https://publications.parliament.uk/pa/cm201719/cmselect/cmsctech/822/822.pdf>

House of Commons, Digital, Culture, Media and Sport Committee (2019) Immersive and addictive technologies [Online]. Available: <https://publications.parliament.uk/pa/cm201719/cmselect/cmcumeds/1846/1846.pdf>
https://www.ofcom.org.uk/__data/assets/pdf_file/0030/198327/call-for-evidence-vsp-regulation.pdf

<https://www.theguardian.com/society/2019/feb/05/youth-unhappiness-uk-doubles-in-past-10-years>

<https://www.today.com/parents/have-social-media-account-your-baby-40-percent-millennial-moms-1D80224937>

Hysing, M., Pallesen, S. and Stormark, KM. (2015). Sleep and use of electronic devices in adolescence: results from a large population-based study

ICO. (2019). Age appropriate design: a code of practice for online services. Wilmslow: Information Commissioner's Office.

ICT Coalition. (2020). ICT Coalition. Retrieved October 10, 2020, from <http://www.ictcoalition.eu>
Internet Matters and Huawei (2018). All the world's a stage: Vlogging, Livestreaming and Parenting in 2018. Available at: <https://www.internetmatters.org/wp-content/uploads/2019/04/Internet-Matters-Report-Livestreaming-and-vlogging.pdf>

ICT Coalition. (2020). ICT Coalition. Retrieved October 10, 2020, from <http://www.ictcoalition.eu>

Internet Matters and Huawei (2018). All the world's a stage: Vlogging, Livestreaming and Parenting in 2018. Available at: <https://www.internetmatters.org/wp-content/uploads/2019/04/Internet-Matters-Report-Livestreaming-and-vlogging.pdf>

Internet Watch Foundation (IWF) Annual Report 2016. Available at: https://www.iwf.org.uk/sites/default/files/reports/2017-04/iwf_report_2016.pdf

Jarrett, H., M., Bailie, M. W., Hagen, E. & Eltringham, S. (2010). Prosecuting Computer Crimes. US Department of Justice, Computer Crime and Intellectual Property Section Criminal Division. Washington: Office of Legal Education Executive Office for United States Attorneys.

Jhaver, S., Birman, I., Gilbert, E. & Bruckman, A. (2019). Human-machine collaboration for content regulation: The case of Reddit Automoderator. . ACM Transactions on Computer-Human Interaction (TOCHI), 26(5), 1-35.

Jigsaw (2020). Internet users' concerns about and potential experience of potential online harms. Ofcom. Available at: <https://www.ofcom.org.uk/research-and-data/internet-and-on-demand-research/internet-use-and-attitudes/internet-users-experience-of-harm-online>

John-Steiner, V. and Mahn, H. (1996). Sociocultural Approaches to Learning and Development: A Vygotskian Framework. Educational Psychologist, 31 (3/4), 191-206.

Johnson, S. B., Blum, R. W., & Giedd, J. N. (2009). Adolescent Maturity and the Brain: The Promise and Pitfalls of Neuroscience Research in Adolescent Health Policy. Journal of Adolescent Health, 45(3), 216-221.

Kardefelt-Winther, D. 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, UNICEF Office of Research – Innocenti, Florence. Available at: <https://www.unicef-irc.org/publications/pdf/Children-digital-technology-wellbeing.pdf>

Katz, A. and El Asam, A. (2020). Vulnerable children in a digital world. Internet Matters. Available at: <https://www.internetmatters.org/wp-content/uploads/2019/04/Internet-Matters-Report-Vulnerable-Children-in-a-Digital-World.pdf>

Keles, B., McCrae, N. and Grealish, A. (2019) A systematic review: the influence of social media on depression, anxiety and psychological distress in adolescents, International Journal of Adolescence and Youth, 25:1, 79-93, DOI: 10.1080/02673843.2019.1590851

Keller, A. (2020). Social media and alcohol. Available at: <https://www.drugrehab.com/addiction/alcohol/influence-of-social-media/>

Kohlberg, L., Levine, C. & Hower, A. (1983). Moral stages: A current formulation and a response to critics. Contributions to Human Development, 10, 174.

Kozinets. (2019). How social media is helping Big Tobacco hook a new generation of smokers. The Conversation. Available at: <https://theconversation.com/how-social-media-is-helping-big-tobacco-hook-a-new-generation-of-smokers-112911>

Kreiss, D. and McGregor, S. C. (2019). The "Arbiters of What Our Voters See": Facebook and Google's Struggle with Policy, Process, and Enforcement around Political Advertising. *Political Communication*, 36(4), 499-522.

Kuss, DJ. (2017) Mobile Technologies and Social Media: The "Extensions of Man" in the 21st Century. *Human Development*, 60(4):141.

Lasher, S. and Baker, C. (2015). Bullying: evidence from the longitudinal study of young people in England 2, wave 2. Department for Education. Available at: https://dera.ioe.ac.uk/24730/1/Bullying_evidence_from_the_longitudinal_study_of_young_people_in_England_2__wave_2_brief.pdf

LeBourgeois, MK., Hale, L., Chang AM., Akacem, LD., Montgomery-Downs, HE. and Buxton, OM. (2017). Digital Media and Sleep in Childhood and Adolescence. *Pediatrics*. Nov;140(Suppl 2):S92-S96. doi: 10.1542/peds.2016-1758J. PMID: 29093040; PMCID: PMC5658795.

Lilley, C., Ball, R. & Vernon, H. (2014). The experiences of 11-16 year olds on social networking sites. London: NSPCC.

Lin, LY., Sidani, JE. and Shensa, A. (2016) Association between social media use and depression among US young adults. *Depress Anxiety*, 33(4):323-31

Livingstone, S. & Smith, P. K. (2014). Research Review: Harms experienced by child users of online and mobile technologies: The nature, prevalence and management of sexual and aggressive risks in the digital age. *Journal of Child Psychology and Psychiatry*, 55, 635-654.

Livingstone, S., Davidson, J., and Bryce, J. (2017) Children's online activities, risks and safety. London: DCMS. Available at: <http://www.lse.ac.uk/business-and-consultancy/consulting/consulting-reports/childrens-online-activities-risks-and-safety>.

Loh, KK. and Kanai, R. (2016). How Has the Internet Reshaped Human Cognition? *The Neuroscientist*. 2016;22(5):506-520. doi:10.1177/1073858415595005

Lumsden, K. and Harmer, E. (2016). Online Othering: Exploring Violence and Discrimination on the Web (pp. 355-378). Basingstoke: Palgrave Macmillan.

Lupiáñez-Villanueva, F., Gaskell, G., Veltri, G., Theben, A., Folkford, F., Bonatti, L., Bogliacino, F., Fernández, L. and Codagnone, C. (2016). Study on the impact of marketing through social media, online games and mobile applications on children's behaviour. European Commission. Available at: <file:///C:/Users/annag/Downloads/EB0216118ENN.en.pdf>

Marchant, A., Hawton, K. & Stewart, A. (2017) A systematic review of the relationship between internet use, selfharm and suicidal behaviour in young people: The good, the bad and the unknown. PLoS ONE, 12(8):e018172.

Marcum, C. D. & Higgins, G. E. (2019). Cybercrime. In M. D. Krohn, N. Hendrix, G. P. Hall, & A. J. Lizotte (Eds.), *Handbooks of Sociology and Social Research*, 2nd edition (pp. 459-475). Cham: Springer Nature Switzerland.

Marino, C., Gini, G., Vieno, A. and Spada, M.M. (2018). A comprehensive meta-analysis on Problematic Facebook use. *Computers in Human Behavior*, 83, 262-77.

Mars, B., Heron, J., Biddle, L et al (2015) Exposure to, and searching for, information about suicide and self-harm on the Internet: Prevalence and predictors in a population based cohort of young adults. *J Affect Disord*, 185:239-45.

Martellozzo, E., Monaghan, A., Adler, J. and Davidson, J. (2017) "I wasn't sure it was normal to watch it..." A quantitative and qualitative examination of the impact of online pornography on the values, attitudes, beliefs and behaviours of children and young people.

Martocci, L. (2017). Self-Cyberbullying. *Psychology Today*. Available at: <https://www.psychologytoday.com/ie/blog/you-can-t-sit-us/201711/self-cyberbullying>

Mascheroni, G., Vincent, J. and Jimenez, E. (2015). "Girls are addicted to likes so they post semi-naked selfies": Peer mediation, normativity and the construction of identity online. *Cyberpsychology: Journal of Psychological Research on Cyberspace*, 9(1). Article 5.

Mazur, A., Caroli, M., Radziewicz, W., et al (2018) Reviewing and addressing the link between mass media and the increase in obesity among European children: The European Academy of Paediatrics (EAP) and The European Childhood Obesity Group (ECOG) consensus statement. *Acta Paediatr*, 107:568-576. 48.

McCrae, N., Gettings, G. & Pursell, E. (2017). Social Media and Depressive Symptoms in Childhood and Adolescence: A Systematic Review. *Adolescent Res Rev*, 2:315-330.

McGuire, M. (2020). It ain't what it is, it's the way that they do it? Why we still don't understand cybercrime. In R. Leukfeldt, & T. J. Holt (Eds.), *The Human Factor of Cybercrime* (pp. 3-28). New York: Routledge.

McGuire, M. & Dowling, S. (2013, October). *Cybercrime: A review of the evidence: Summary of key findings and implications*. London: Home Office.

McLeod, S. (2017, February 21). Erik Erikson | Psychosocial Stages. Retrieved November 12, 2020, from SimplyPsychology: https://docuri.com/download/erik-erikson-psychosocial-stages-simply-psychology_59c1e23ff581710b286a64c6.pdf

Memon, A. M., Sharma, S. G., Mohite, S. S. and Jain, S. (2018). The role of online social networking on deliberate self-harm and suicidality in adolescents: A systematized review of literature. *Indian journal of psychiatry*, 60(4), 384-392. https://doi.org/10.4103/psychiatry.IndianJPsychiatry_414_17

Mertala, P. (2019). Young children's conceptions of computers, code, and the Internet. *International Journal of Child-Computer Interaction*, 19, 56-66.

Miles, K. (2020). The law on underage sexting needs to change – here's how. *The Conversation*. Available at: <https://theconversation.com/the-law-on-underage-sexting-needs-to-change-heres-how-132473>

Moreno, M. A. & Uhls, Y. T. (2019). Applying an affordances approach and a developmental lens to approach adolescent social media use. *Digital Health*, 5, 1-6.

Morgan, B. (2016). Is social media messing with children's morals? *The Conversation*. Available at: <https://theconversation.com/is-social-media-messing-with-childrens-morals-62579>

National Research Council and Institute of Medicine. (2000). *m Neurons to Neighborhoods: The Science of Early Childhood Development*. (J. P. Shonkoff, & D. A. Phillips, Eds.) Washington, D.C.: National Academy Press.

National Scientific Council on the Developing Child. (2007). *The Timing and Quality of Early Experiences Combine to Shape Brain Architecture: Working Paper #5*. Center on the Developing Child at Harvard University.

Net Aware. (2020). Apps, games and social media sites. Retrieved October 10, 2020, from <https://www.net-aware.org.uk/networks/?function=searchApplication&limit=12&type=Audio%20/%20video%20sharing>

NHS Digital (2017). *Mental Health of Children and Young People in England, 2017. Summary of Key Findings*. Available at: <https://files.digital.nhs.uk/F6/A5706C/MHCYP%202017%20Summary.pdf>

NHS Digital (2018) *Mental Health of Children and Young People in England, 2017 Behaviours, lifestyles and identities* [Online]. Available: <https://files.digital.nhs.uk/C9/999365/MHCYP%202017%20Behaviours%20Lifestyles%20Identities.pdf>

Nowland, R., Necka, E. A. and Cacioppo, J. T. (2018). Loneliness and social internet use: Pathways to reconnection in a digital world? *Perspectives on Psychological Science*, 13, 70-87.

NSPCC (2016). What children are telling us about bullying. Available at: <https://learning.nspcc.org.uk/research-resources/2016/what-children-telling-childline-about-bullying>

NSPCC (2017). Net Aware report 2017 – “freedom to express myself safely”. Available at: <https://learning.nspcc.org.uk/research-resources/2017/net-aware-report-2017-freedom-to-express-myself-safely>

NSPCC (2018) Sexting. Available: <https://www.nspcc.org.uk/preventing-abuse/keeping-children-safe/sexting/>

NSPCC (2018). NSPCC Online Abuse. Available: <https://www.nspcc.org.uk/preventing-abuse/child-abuse-and-neglect/online-abuse/>

Oberman, L. & Pascual-Leone, A. (2013). Changes in plasticity across the lifespan: cause of disease and target for intervention. *Progress in brain research*, 207, 91-120.

October 22, 2020, from BBC News: <https://www.bbc.co.uk/news/magazine-24173194>

Ofcom (2020). Life in Lockdown. Available at:
https://www.ofcom.org.uk/__data/assets/pdf_file/0024/200976/cml-life-in-lockdown-report.pdf

Ofcom. (2018). Children and parents: Media use and attitudes report 2018. London: Ofcom.

Ofcom. (2019a). Ofcom Parents' and Children's Media Literacy Tracker 2019, ages 3-15. London: Ofcom.

Ofcom. (2019b). Ofcom Adults' Media Literacy Tracker 2019 ages 16+. London: Ofcom.

Ofcom. (2020, July 16). Video-sharing platform regulation: Call for Evidence. Retrieved October 21, 2020, from Ofcom. (2020). Online Nation: 2020 Report. London: Ofcom.

Office for National Statistics (ONS) (October, 2015). More children using social media report mental ill-health symptoms. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/morechildrenusingsocialmediareportmentalillhealthsymptoms/2015-10-20#:~:text=The%20Children's%20Well%2Dbeing%202015,scores%20for%20mental%20ill%2Dhealth>.

Ofcom (2020). Children's Media Use and Attitudes. Available at: <https://www.ofcom.org.uk/research-and-data/media-literacy-research/childrens>

Ofcom (2020). Online Nation. Available at: <https://www.ofcom.org.uk/research-and-data/internet-and-on-demand-research/online-nation>

Oksanen, A., Nasi, M., Minkkinen, J., Keipi, T., Kaakinen, M. and Rasanen, P. (2016). Young people who access harm-advocating online content: A four country survey.

Ophir, E., Nass, C. and Wagner, AD. (2009) Cognitive control in media multitaskers. *Proceedings of the National Academy of Sciences*, 106(37):15583-7. 57.

Orben, A. & Przybylski, A. K. (2019). The association between adolescent well-being and digital technology use. *Nature Human Behaviour*, 3(2), 73-182. <https://doi.org/10.1038/s41562-018-0506-1>

Orlando, J. (2019). TikTok can be good for your kids if you follow a few tips to stay safe. The conversation. Available at: <https://theconversation.com/tiktok-can-be-good-for-your-kids-if-you-follow-a-few-tips-to-stay-safe-144002>

Paoli, L., Visschers, J., Verstraete, C. & Van Hellemonst, E. (2018). The Impact of Cybercrime on Belgian Businesses. Intersentia.

Papamichail, M. and Sharma, N. (2019) Left to their own devices: young people, social media and mental health. Barnardo's: Essex. Available at:
https://www.barnardos.org.uk/sites/default/files/uploads/B51140%2020886_Social%20media_Report_Final_Lo%20Res.pdf

Parker, D. (1976). *Crime by computer*. New York, NY: Charles Scribner's Sons.

Payne, B. K. (2020). Defining Cybercrime. In T. J. Holt, & A. M. Bossler, *The Palgrave Handbook of International Cybercrime and Cyberdeviance* (pp. 3-25, DOI: 10.1007/978-3-319-78440-3_1 3). New York: Springer International Publishing AG.

Peng, M., Chen, X., Zhao, Q. and Zhou, Z. (2018) Attentional scope is reduced by Internet use: A behavior and ERP study. *PLoS One*. 2018 Jun 8;13(6):e0198543. doi: 10.1371/journal.pone.0198543. PMID: 29883465; PMCID: PMC5993299.

Peter, J. and Valkenburg, P M. (2016). Adolescents and Pornography: A Review of 20 Years of Research. *The Journal of Sex Research*, 53(4-5), 1-23.

Pew Research Center. (2018). *Teens, Social Media & Technology 2018*. Washington: Pew Research Center.

Pew Research Centre (2015). Internet Seen as Positive Influence on Education but Negative on Morality in Emerging and Developing Nations. Available at:
<https://www.pewresearch.org/global/2015/03/19/internet-seen-as-positive-influence-on-education-but-negative-influence-on-morality-in-emerging-and-developing-nations/>

Piaget, J. (1964). Cognitive Development in Children: Piaget. *Journal of Research in Science Teaching*, 2, 176-186.

Pluhar, E., Kavanaugh, J. R., Levinson, J. A. and Rich, M. (2019). Problematic interactive media use in teens: comorbidities, assessment, and treatment. *Psychology research and behavior management*, 12, 447-455.
<https://doi.org/10.2147/PRBM.S208968>

Przybylski, A. and Andrew, K. (2019) The association between adolescent well-being and digital technology use. *Nature and Human Behaviour*

Przybylski, A. (2018). Digital Screen Time and Pediatric Sleep: Evidence from a Preregistered Cohort Study. *J Pediatr*. 2019 Feb;205:218-223.e1. doi: 10.1016/j.jpeds.2018.09.054. Epub 2018 Nov 2. PMID: 30396683. Psychiatric Disorders: A Systematic Review of Recent Large-Scale Studies. *Front Psychiatry*, 14(9):686.

Quayle, E., Goren Svedin, C. and Jonsson, L. (2017). Children in identified sexual images - Who are they? Self and non-self-taken images. In the International Child Sexual Exploitation image database (ICSE DB) 2006-15. *Child Abuse Review* (accepted January 2017).

Quinlan, A. (15 April, 2016). Virtual outsiders: Concern for generation of boys isolated in online world of social media and porn. Irish Examiner. Available at: <https://www.irishexaminer.com/lifestyle/arid-20392852.html>

Rosen, R. (2016). The Perfect Generation: Is the internet undermining young people's mental health? Parentzone. Available at: <https://parentzone.org.uk/sites/default/files/The%20Perfect%20Generation%20report.pdf>

Roser, M., Ritchie, H., & Ortiz-Ospina, E. (n.d.). Internet. Retrieved 10 15, 2020, from <https://ourworldindata.org/internet>

Royal College of Paediatrics and Child Health (RCPCH)(2020). The health impact of screen time: a guide for clinicians and parents. Available at: https://www.rcpch.ac.uk/sites/default/files/2018-12/rcpch_screen_time_guide_-_final.pdf

Royal College of Psychiatrists (2020). Technology use and the mental health of children and young people. Available at: <https://www.rcpsych.ac.uk/improving-care/campaigning-for-better-mental-health-policy/college-reports/2020-college-reports/Technology-use-and-the-mental-health-of-children-and-young-people-cr225>

Royal Society for Public Health (RSPH) (2017). StatusOfMind; Social media and young people's mental health and wellbeing. Available at: <https://www.rsph.org.uk/uploads/assets/uploaded/d125b27c-0b62-41c5-a2c0155a8887cd01.pdf>

Sarre, R., Lau, L. Y.-C., & Chang, L. Y. (2018). Responding to cybercrime: current trends. *Police Practice and Research*, 19(6), 515-518.

Scott, A.J. and Gavin, J. (2018) 'Revenge pornography: the influence of perpetrator-victim sex, observer sex and observer sexting experience on perceptions of seriousness and responsibility', *Journal of Criminal Psychology*, 8(2), pp. 162-172.

Seabrook, EM., Kern, ML. and Rickard, NS. (2016) Social Networking Sites, Depression, and Anxiety: A Systematic Review. *JMIR Ment Health*, 3(4):e50.

Sezgin, E., Turhan, C., Karaaslan, S. and Bayrak, G. (January, 2019). Investigation of Digital Gaming Addiction and Loneliness of University Students. Conference: International Child and Information Safety Congress, "Digital Games".

Singaravelu, V., Stewart, A., Adams, J., Simkin, S. and Hawton, K. (2015). Information-Seeking on the Internet. *Crisis*. 2015;36(3):211-9. doi: 10.1027/0227-5910/a000307. Epub 2015 Jun 19. PMID: 26088826.

Smahel, D., Machackova, H., Mascheroni, G., Dedkova, L., Staksrud, E., Ólafsson, K., Livingstone, S. and Hasebrink, U. (2020). EU Kids Online 2020: Survey results from 19 countries. EU Kids Online. <https://doi.org/10.21953/lse.47fdeqj01ofo>

Sonderby, C. (2019). Update on New Zealand. Retrieved 10 16, 2020, from <https://about.fb.com/news/2019/03/update-on-new-zealand/>

Soper, S. (2018). Amazon Increases Ad Market Share at Expense of Google, Facebook. Retrieved 10 15, 2020, from <https://www.bloomberg.com/news/articles/2018-09-19/amazon-increases-ad-market-share-at-expense-of-google-facebook>

Spear, L. P. (2000). The adolescent brain and age-related behavioral manifestations. *Neuroscience & Biobehavioral Reviews*, 24, 417-463.

Sredniawa, A., Jarczewska, DL., Zabicka, K et al (2015) Internet addiction among graduates of general secondary schools in Cracow and its correlation with body mass index and other health problems. *Pol Merkur Lekarski*, 39(229):31-6. 46.

Steinberg, L. (2007). Risk-taking in adolescence: New perspectives from brain and behavioral science. *Current Directions in Psychological Science*, 16, 55-9.

Stiglic, N. and Viner, R. (2018). Effects of screentime on the health and well-being of children and adolescents: a systematic review of reviews. *BMJ Open*, 8. Stonewall and Childnet (2020). Staying safe online. Available at: https://www.stonewall.org.uk/system/files/staying_safe_online_-_stonewall_childnet_1.pdf

SuperAwesome. (2019). Kids digital media report 2019. London: SuperAwesome.

SuperAwesome. (2020). 7 best practices for kid-safe influencer marketing. London: SuperAwesome.

The Guardian. (2019, February 5). Anxiety on rise among the young in social media age. Retrieved November 17, 2020, from The Guardian

The Interagency Working Group. (2016). Terminology Guidelines for the Protection of Children from Sexual Exploitation and Sexual Abuse. Rachathewi, Bangkok: ECPAT International and ECPAT Luxembourg.

Thomas, D. & Loader, B. (2000). *Cybercrime: Law enforcement, security and surveillance in the information age*. (D. Thomas, & B. Loader, Eds.) London: Routledge.

THORN. (2020). The road to Safer: Equipping industry to end CSAM. Retrieved 10 16, 2020, from <https://www.thorn.org/blog/announcing-safer-built-by-thorn-eliminate-csam/>

Tian, Y., Zhang, S., Wu, R., Wang, P., Gao, F. and Chen, Y. (2018). Association Between Specific Internet Activities and Life Satisfaction: The Mediating Effects of Loneliness and Depression. *Frontiers in Psychology*, 9.

Tsakalidis, G. & Vergidis, K. (2017). A systematic approach toward description and classification of cybercrime incidents. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 49(4), 710-729.

Tsakalidis, G., Vergidis, K. & Madas, M. (2018). Cybercrime Offences: Identification, Classification and Adaptive Response. (pp. 470-475). Thessaloniki, Greece: 5th International Conference on Control, Decision and Information Technologies (CoDIT), IEEE.

Tsitsika, AK., Andrieu EK. and Psaltopoulou, T. (2016) Association between problematic internet use, socio-demographic variables and obesity among European adolescents. *Eur J Public Health*, 26(4):617-22.

Twenge, J. M. (2017, September). Have Smartphones Destroyed a Generation? Retrieved from The Atlantic: <https://www.theatlantic.com/magazine/archive/2017/09/has-the-smartphone-destroyed-a-generation/534198/>

Twenge, J. M., Martin, G. N. and Campbell, W. K. (2018). Decreases in psychological well-being among American adolescents after 2012 and links to screen time during the rise of smartphone technology. *Emotion*, 18(6), 765-780. <https://doi.org/10.1037/emo0000403>

Twenge, J.M., Spitzberg, B.H. and Campbell, W.K. (2019) Less in-person social interaction with peers among U.S. adolescents in the 21st century links to loneliness. *Journal of Social and Personal Relationships*, 36 (6).

UK Council for Child Internet Safety (UCCIS) (2017). Children's online activities, risks and safety. A literature review by the UKCCIS Evidence Group. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/650933/Literature_Review_Final_October_2017.pdf

UK Council for Child Internet Safety UKCCIS (2016). Child Online Safety Guide. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/487973/ukccis_guide-final__3_.pdf

UK Safer Internet Centre (2017). Power of Image Report. Available at: <https://www.saferinternet.org.uk/safer-internet-day/2017/power-of-image-report>

UK Safer Internet Centre. (2018b, June 7). Social Media and the Age of Consent. Retrieved November 13, 2020, from UK Safer Internet Centre: <https://www.saferinternet.org.uk/blog/social-media-and-age-consent>

UK Safer Internet Centre. (2018a, April 25). Age Restrictions on Social Media Services. Retrieved November 13, 2020, from UK Safer Internet Centre: <https://www.saferinternet.org.uk/blog/age-restrictions-social-media-services>

Uncapher, MR. and Wagner, AD. (2018). Minds and brains of media multitaskers: Current findings and future directions. *Proceedings of the National Academy of Sciences*, 115(40):9889-96. 59.

United Kingdom Chief Medical Officers (UK CMO) (2019) Screen-based activities and children and young people's mental health and psychosocial wellbeing: a systematic map of reviews [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/777026/UK_CMO_commentary_on_screentime_and_social_media_map_of_reviews.pdf

Van der Hulst, R. C. & Neve, R. J. (2008). High Tech Crime. Literature review about crimes and their offenders. The Hague: WODC (Research and Documentation Centre).

Van Soelen, I. L., Brouwer, R. M., van Baal, G. C., Schnack, H. G., Peper, J. S., Collins, D. L. and Hulshoff Pol, H. E. (2012). Genetic influences on thinning of the cerebral cortex during development. *Neuroimage*, 59(4), 3871-3880.

Verduyn, P., Ybarra, O., Resibois, M., Jonides, J. and Kross, E. (2017). Do Social Network Sites Enhance or Undermine Subjective Well-Being? A Critical Review *Social Issues and Policy Review*, Vol. 11, No. 1, 2017, pp. 274–302.

Viano, E. C. (2017). Cybercrime: Definition, Typology, and Criminalization. In E. C. Viano (Ed.), *Cybercrime, Organized Crime, and Societal Responses* (pp. 3-22). Cham, Switzerland: Springer International Publishing.

Viner, RM., Aswathikuty-Gireesh, A. and Stiglic, N. (2019) Roles of cyberbullying, sleep, and physical activity in mediating the effects of social media use on mental health and wellbeing among young people in England: a secondary analysis of longitudinal data. *Lancet Child Adolesc Health*.

Voss, P. (2013). Sensitive and critical periods in visual sensory deprivation. *Frontiers in Psychology*, 4, 664.

Wall, D. S. (2001). Cybercrime and the Internet. In D. S. Wall (Ed.), *Crime and the internet* (pp. 1-17). New York, NY: Routledge.

Wall, D. S. (2007). *Cybercrime: The transformation of crime in the information age*. Malden: Polity Press.

Wallis, L. (2013, September 23). Is 25 the new cut-off point for adulthood? Retrieved

Walsh, J.J. et al. (2018). Associations between 24 hour movement behaviours and global cognition in US children: a cross-sectional observational study. *Lancet Child and Adolescent Health*. Published online September 26, 2018. doi: 10.1016/S2352-4642(18)30278-5.

Wang, K., Frison, E., Eggermont, S. and Vandenbosch, L. (2018). Active public Facebook use and adolescents' feelings of loneliness: Evidence for a curvilinear relationship. *Journal of Adolescence*, 67, 35-44.

Weber, M. (1904/1949). Objectivity in social science and social policy. In E. A. Shils, & H. A. Finch (Eds.), *The methodology of the social sciences*. New York, NY: Free Press.

Weinstein, N., Przybylski, A. K. and Murayama, K. (2017). A prospective study of the motivational and health dynamics of Internet Gaming Disorder. *PeerJ*, 5, e3838. <https://doi.org/10.7717/peerj.3838>

Whitbourne, S. K. (2012). *Life Span Development*. Washington: American Psychological Association.

Wood, M., Barter, C. Stanley, N. Aghtaie, N. and Larkins, C. (2015). Images across Europe: The sending and receiving of sexual images and associations with interpersonal violence in young people's relationships. *Children and Youth Services Review*, 59, 149-160.

Worrall, J. (1982). Scientific realism and scientific change. *Philosophical Quarterly*, 32(128), 201-131.

Xiaoyue, L., Xiao, L., Ming, Z., Yanbo, H., Yifan, W., Lingxiao, W., Xiaoxia, D. and Guangheng, D. (2018). Internet Search Alters Intra- and Inter-regional Synchronization in the Temporal Gyrus, *Frontiers in Psychology*, 10.3389/fpsyg.2018.00260, 9

Yar, M. (2013). The policing of internet sex offences: Pluralised governance versus hierarchies of standing. *Policing and Society*, 23(4), 482-497.

Yar, M. & Steinmetz, K. F. (2019). *Cybercrime and Society* (Third Edition ed.). London: SAGE Publications Limited.

Yifan W., Lingdan, W., Liang, L., Yifen, Z. and Guangheng, D. (2017). Short-term Internet search using makes people rely on search engines when facing unknown issues, *PLOS ONE*, 10.1371/journal.pone.0176325, 12, 4, (e0176325)

YoungMinds (2016) Resilience for the Digital World. Available at:
https://youngminds.org.uk/media/1490/resilience_for_the_digital_world.pdf

YoungMinds (2018) Safety Net: Cyberbullying's impact on young people's mental health [Online]. Available:
https://youngminds.org.uk/media/2189/pcr144b_social_media_cyberbullying_inquiry_full_report.pdf

YoungMinds and the Children's Society (2017). Safety Net Report: Impact of Cyberbullying on Children's Mental Health. Available at: <https://youngminds.org.uk/resources/policy-reports/cyberbullying-inquiry/>

Appendices

Appendix A: Detailed Methodology

1. Literature review

Research aims/questions

A non-exhaustive literature review was conducted, to consider four research questions:

1. What are the benefits of the Internet for children and young people?
2. What are the risks of harms that may impair minor's physical, mental and moral development?
3. What social solutions exist to address online harms?
5. What safety tech solutions exist to address online harms?

A non-exhaustive literature review is one in which the most recent and relevant articles in an area are searched for, identified, extracted and analysed.

Inclusion/exclusion criteria for material

The initial step in identifying relevant material was to set the inclusion/exclusion criteria for the literature, which were agreed between UEL and Ofcom. The key inclusion criteria were:

- studies published between 2015-2020;
- studies from North America, Britain, and Europe;
- English language publications; and
- all research methods, prioritising meta-analyses and literature reviews.

Generation of search terms

Search terms were subsequently developed from the research questions. Key words were identified related to the areas of interest, ensuring that all synonyms were considered. These were then developed into search strings, using Boolean operators to target the searches. From the search terms, four search strings were then generated:

Search string 1: Benefits

(Online OR Cyber OR Digital OR Virtual OR Internet OR VSP OR Video-sharing platform) AND (Benefit* OR Positive) AND (Child* OR Young* OR Adolescent* OR Teenage* OR Minor* OR Kid* OR Youth* OR Juvenile*) NOT (Adult OR Wom?n OR M?n)

Search string 2: Risks/Harms

(Online OR Cyber OR Digital OR Virtual OR Internet OR VSP OR Video streaming platform) AND (Harm* OR Risk*) AND (Child* OR Young* OR Adolescent* OR Teenage* OR Minor* OR Kid* OR Youth* OR Juvenile*) NOT (Adult OR Wom?n OR M?n)

Search string 3: Social solutions

(Online OR Cyber OR Digital OR Virtual OR Internet OR VSP OR Video streaming platform) AND (Education OR Awareness OR Digital literacy OR Digital resilience) AND (Child* OR Young* OR Adolescent* OR Teenage* OR Minor* OR Kid* OR Youth* OR Juvenile*) NOT (Adult OR Wom?n OR M?n)

Search string 4: SafetyTech

(Online OR Cyber OR Digital OR Virtual OR Internet OR VSP OR Video streaming platform) AND (SafetyTech) AND (Child* OR Young* OR Adolescent* OR Teenage* OR Minor* OR Kid* OR Youth* OR Juvenile*) NOT (Adult OR Wom?n OR M?n)

Literature searching

The relevant literature was identified through three main methods:

- systematic searches for relevant literature on academic database PsycInfo;
- an online search for grey literature (e.g from government bodies, charities, NGOs, independent consultancies, and industry) using Google; and
- a call for papers, disseminated via social media, with a view to identifying the most up to date key papers in the area, in addition to seminal literature.

Both databases allow ordering of results by relevance, and only the first 50 results were reviewed from each database, for each search, given the tight timeframe of the project.

Data abstraction

The first stage of data abstraction involved searching the academic database PsycInfo for each search string in turn. Taking the first 50 results (sorted by relevance) these were then screened in more depth; firstly by title, secondly by abstract, and lastly by full text articles, obtained through the UEL Library, author's website or university, Researchgate, Linkedin, and using Inter-library loans. This process was then repeated for the Google searches, using modified search strings, again taking the first 50 'hits' for each. Lastly, material from the call for papers was sifted through and assessed for relevance. Table 8 below breaks down the number of papers by search string, yielding a total of 186 papers for analysis and synthesis.

Table 8: Breakdown of number of papers by search string

Search string	Research question	Number of papers
1	Benefits	40
2	Risks/Harms	100
3	Social solutions	17
4	Safetytech	29
Total		186

2. Frameworks

In order to develop the interdependent frameworks, an inductive/bottom-up/data-driven approach – as opposed to a deductive/top-down/theoretical approach – was taken. Four frameworks emerged from the literature review:

- (i) a framework of benefits;
- (ii) a framework of risk;
- (iii) a framework of social solutions; and
- (iv) a framework of safety tech.

Appendix B: General Advisory Guidelines Resources

Year	Organisation	Title of Referenced Work	Reference/Link to information & Why works are included in the table
2019	AAP (American Academy of Paediatrics)	Digital guidelines: Promoting healthy technology use for children	https://www.apa.org/topics/healthy-technology-use-children Why? APA provides "Pointers for parents to keep in mind when establishing guidelines for children's technology use"
2020	CDC (Center for Disease Control and Prevention)	Positive Parenting Tips	https://www.cdc.gov/ncbddd/childdevelopment/positiveparenting/index.html Why? CDC is a national public health institute in the United States, this link is one of first to appear on google from term "Child Development"
2020	CEOP (Child Exploitation and Online Protection Command)	Thinkuknow	https://www.thinkuknow.co.uk Why? "Thinkuknow includes films, animations, websites, presentations and lesson plans [regarding online safety] to enable professionals to explore difficult and sensitive issues safely with children and young people"
2020	Common Sense Media (1)	Media content ratings system	https://www.commonsensemedia.org/about-us/our-mission/about-our-ratings Why? "Common Sense Media publishes independent ratings and reviews for nearly everything kids want to watch, read, play, and learn... Each of our [Common sense Media] ratings and reviews is based on important, fundamental child development principles."
2020	Common Sense Media (2)	Parents Need to Know	https://www.commonsensemedia.org/parent-concerns Why? Under Common Sense Media's "Parents need to know tab" advice is divided by age ranges, as shown in the table.

Year	Organisation	Title of Referenced Work	Reference/Link to information & Why works are included in the table
2020	ICO (Information Commissioner's)	Age Appropriate Design Code, Annex B: Age and developmental stages	https://www.itu.int/en/cop/Documents/S-GEN-COP.CHILD-2016-PDF-E%5B1%5D.pdf Why? ITU provides guidelines for children and young people in all parts of the world on how to keep themselves and others safe online - by age range pp. 47-55
2016	ITU (International Telecommunication Union)	Guidelines for Children on Child Online Protection	https://www.itu.int/en/cop/Documents/S-GEN-COP.CHILD-2016-PDF-E%5B1%5D.pdf Why? ITU provides guidelines for children and young people in all parts of the world on how to keep themselves and others safe online - by age range pp. 47-55
2018 2019	Ofcom	Children and parents: Media use and attitudes report 2018	https://www.ofcom.org.uk/research-and-data/media-literacy-research/childrens/children-and-parents-media-use-and-attitudes-report-2019 Why? The Ofcom report provides detailed evidence on media use, attitudes and understanding among children and young people aged 5-15, as well as detailed information about media access and use by young children aged 3-4. Age bands shown on p.3
1954	Piaget	Stages of Cognitive Development	https://www.webmd.com/children/piaget-stages-of-development#1 Why? Piaget is a preeminent developmental psychologist and his theories broke new ground in 1936, shaping an entire field of psychology, his works have been cited approx. 500,000 times.
2020	UKCIS (UK Council for Internet Safety)	Education for a Connected World - 2020 edition	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/896323/UKCIS_Education_for_a_Connected_World_.pdf Why? UKCIS developed a framework to equip children and young people for digital life, advice is broken down into 4 age ranges
2020	YouTube Kids	Parental controls and settings	https://support.google.com/youtubekids/answer/6172308 Why? VSP that provides content settings tailored to 3 different age ranges (for 13s and under). At 13 children are able to access YouTube (main platform).

Appendix C: Biographies

The Institute for Connected Communities

The Institute for Connected Communities (ICC) at the University of East London focuses on offline and online communities exploring contemporary issues including harms, cybercrime, safety, security, health and wellbeing. The ICC's is an interdisciplinary cluster including world leading academics from health, criminology and cybercriminology, cyberpsychology, psychology, policing and law working across the university and wider society. The ICC has a substantial portfolio of high-quality, externally funded national and international research projects that are innovative and impact upon policy, practice and communities. The ICC works with governments worldwide, industry, service providers, practitioners and communities.

Research project Co-leads Professor Julia Davidson and Professor Mary Aiken

Co-lead Professor Julia Davidson

Julia Davidson PhD is Professor of Criminology at the University of East London and Director of the Institute for Connected Communities. She is recognised internationally as one of the foremost experts on policy, practice and offending in the area of cybercrime, online harms and online child abuse. She is Chair of the UK Council for Internet Safety Evidence Group and provides expert advice to national and international organisations. She is Chair of the Ethics Committee of the UK Independent Inquiry into CSA and is a member of the Europol Cybercrime Centre Expert Academic Advisory Group. Prof Davidson has 30 years' experience of directing large scale research projects and programmes and has advised governments worldwide on child online protection.

Twitter: @JuliaDavidson13

Co-lead Professor Mary Aiken

Mary Aiken PhD is a Professor of Forensic Cyberpsychology in the Department of Law and Criminology at the University of East London and Adjunct Professor at the Geary Institute for Public Policy University College Dublin, Ireland. Professor Aiken is recognised as an international expert in policy debates at the intersection of technology and human behaviour. She is an Academic Advisor to Europol's European Cybercrime Centre (EC3), Fellow of The Royal Society of Medicine, Global Fellow at the Washington DC Wilson Center, member of the Medico-Legal Society, International Affiliate Member of the American Psychological Association (APA) and Fellow of the Society for Chartered IT Professionals.

Twitter: @maryCyPsy

Research Fellow Dr Anna Gekoski

Dr Anna Gekoski is a Forensic Psychologist and Criminologist. She is Director of Research at Broome|Gekoski Ltd, a visiting lecturer at Middlesex University, and a Research Associate at the Institute of Connected Communities at UEL. Anna has 15 years of experience in conducting trauma-focused qualitative research, with a particular emphasis on sexual and violent offending, cyber-crime, mental health and wellbeing.

Research Assistant Kirsty Phillips

Kirsty graduated University College London with a Distinction in Research Methods in Psychology MSc and Warwick University with a First Class degree in Psychology, BSc (with Honours). She is currently studying (part-time) for a PhD, in Psychology, at Birkbeck, University of London.

Research Assistant Ruby Farr

Ruby Farr has a degree in criminology and has worked in research at the University of East London since 2012. Ruby is currently studying (part-time) for her PhD in Public Health, specifically exploring the life course, civic engagement and health and wellbeing.