

Toddlers, Tablets & Tantrums? An Enquiry into the Relationship Between Early Years Screen Time and the Behaviour Crisis in Scottish Primary Schools

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- I am the sole author of this Extended Professional Enquiry
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- My Extended Professional Enquiry does not contain work extracted from a thesis, dissertation or research paper previously presented for another degree or diploma at this or any other university

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1. Introduction

1.1 Introduction

Behavioural concerns have become increasingly visible across Scottish primary schools, with teachers reporting short attention spans, violent outbursts, and difficulties with emotional regulation (Scottish Government, 2023), fuelling what many describe as a growing “behaviour crisis.” Alongside this, children’s early lives are increasingly digital (OECD, 2025), with hours spent on screens from infancy, often before key social and emotional skills have fully developed. These parallel trends suggest a possible connection between early years screen exposure and the behavioural patterns now emerging in classrooms (Mallawaarachchi et al., 2025; Vanderloo, 2022).

1.2 Motivation

As a teacher researcher, this pressing issue originates directly from my professional experiences on school placements. I have observed first-hand how digital habits appear to shape children’s readiness for school, with pupils displaying reduced ability to concentrate, limited tolerance for frustration, and weaker communication or play skills. These patterns, paired with my experiences working in hospitality, where even babies were focused on screens at the table rather than interacting with those around them, prompted me to question how early and prolonged exposure to screens may influence young children’s social, emotional and behavioural development. In line with Cochran-Smith and Lytle’s (2009) concept of practitioner enquiry, educators can transform personal experiences into professional and research informed understanding, making this a meaningful focus for investigation.

As digital access expands, so does the responsibility of educators to interpret its effects critically and to respond with informed evidence-based practice. This notion is mirrored within the GTCS Standards for Registration (2019), particularly Standard 1.2 Professional Commitment and Standard 3.3.1 Engage Critically with Research Literature and Policy. By linking my personal observations with professional standards and research (Cochran-Smith & Lytle, 2009), this enquiry is motivated by a commitment to contribute to a deeper understanding of how educators can navigate the behavioural needs of today’s learners in the digital world.

1.3 Rationale and Significance

The rationale and significance of this enquiry extends beyond individual classroom experiences. For practitioners, examining this relationship may illuminate underlying causes of behavioural challenges and support more responsive teaching strategies. For policy makers, it may inform guidance for parents and early years providers, helping to establish balanced approaches to digital engagement that promote healthy social and emotional development. Academically, this study addresses a notable gap in the research; while international studies highlight potential impacts of screen exposure (Kim & Chung, 2023; Mallawaarachchi et al., 2025; Vanderloo et al., 2022), there is limited evidence situated within the Scottish educational context. Contributing to this emerging field is therefore significant, offering insights that can inform local practice and the wider academic conversation in addressing the behaviour crisis.

1.4 Aims and Research Questions

The overarching aim of this enquiry is to critically examine existing literature to explore the relationship between the rise in early years screen time and behavioural challenges observed in Scottish primary schools. From this, I have mapped 2 main research questions to pursue:

1. What does the current literature reveal about the relationship between early years screen use and behavioural development?
2. How might findings from international research be interpreted within the Scottish educational context?

2. Background

2.1 Introduction

Reports of a behaviour crisis in Scottish primary schools have intensified in recent years (Brooks, 2025; NASUWT, 2025), with teachers and policymakers noting increases in disruption, inattention and emotional dysregulation in classrooms (Educational Institute of Scotland (EIS), 2023; Scottish Government, 2023). At the same time, young children's use of digital screens has expanded rapidly (Byrne, 2021; UK Parliament Education Committee, 2024), accelerated by the COVID-19 pandemic and the integration of tablets and smartphones into daily family routines (McArthur et al., 2022). The simultaneous increase of screen exposure in early childhood and escalating behavioural difficulties in schools has sparked debate regarding the potential impact of early digital interactions on subsequent self-regulatory, social and cognitive development (Mallawaarachchi et al., 2024; Prashanth, 2025; OECD, 2025).

This chapter defines the key concepts underpinning the study, traces how ideas about children's screen use have evolved, discusses current debates, and explains why the topic is highly relevant in the Scottish context today.

2.2 Defining Key Concepts

Screen time refers to the use of electronic devices such as televisions, tablets, smartphones and computers (Cambridge Dictionary, n.d.). Earlier research focused on passive television viewing (Duch et al., 2013), while contemporary studies recognise distinctions between interactive, educational and social media use (Santos et al., 2022; Ma et al., 2024).

The early years (birth to five) constitute a period of rapid neurological and socio-emotional development in which executive functions emerge (Diamond, 2013; Zelazo, 2015). These underpin self-regulation, the ability to manage attention, emotion, and behaviour (Diamond, 2013; Zelazo, 2015). Evidence indicates that high or unsupervised screen exposure during this stage may hinder the development of these skills, leading to later difficulties with emotional control and social interaction (Hu et al., 2020; Cerniglia et al., 2021; Wan et al., 2021; Ma et al., 2024).

Within Scotland, the term behaviour crisis was coined by media narratives by using provocative language such as ‘emergency’, ‘warzone’, and ‘crisis’ (Ross, 2024; Barker, 2025; Sanderson, 2025) when referring to the increasing reports of disruption, violence and emotional distress in schools (EIS, 2023; Scottish Government, 2023).

These behaviours parallel those associated with low levels of self-regulation, suggesting a potential conceptual overlap between early digital experiences, developmental processes, and behavioural outcomes central to this enquiry.

2.3 Historical Development and Evolution of Ideas

Concerns about children’s media exposure are not new. In the late twentieth century, television and video games were often framed as a threat to attention, imagination, and moral development, with public discourse dominated by moral panic narratives (Critcher, 2012). The 2000s and into the early 2010s brought a shift toward interactive and educational digital technologies, accompanied by optimism about children becoming “digital natives” who would thrive in technologically enriched environments (Prensky, 2001; Judd, 2018). This period marked a shift from concerns about passive consumption to debates about interactivity, content quality, and developmental appropriateness (Mallawaarachchi et al., 2024). More recently, the COVID-19 lockdowns normalised digital reliance for both adults and children, increasing both screen duration and parental dependence on screens for regulation and childcare (Growing Up in Scotland [GUS], 2022). Neil Postman’s (1992) theory of Technopoly helps to frame this cultural shift: as technology becomes self-legitimising, societies come to view technological mediation as inevitable and desirable, with childhood itself increasingly lived through screens (OECD, 2025).

2.4 Current Debates and Issues

Contemporary research debates focus on both the potential harms and benefits of early screen use. Some studies suggest that excessive or fast-paced digital stimulation may hinder the crucial child development (Mallawaarachchi et al., 2024, 2025; Hu et al., 2020; Eirich et al., 2022) whereas others emphasise the educational potential of high-quality, age-appropriate content (Taylor et al., 2022).

Policy debates surrounding early years screen use reflect both international diversity and national inconsistency. Global health and paediatric organisations advise relatively strict screen time limits for children under five, often recommending no exposure before age two and no more than one hour per day thereafter (American Academy of Child and Adolescent Psychiatry (AACAP), 2025; Canadian Paediatric Society, 2022; World Health Organisation (WHO), 2019). In contrast, current UK and Scottish guidance prioritises *balance* and *family discretion* over fixed time limits (Royal College of Paediatrics and Child Health, 2019; NSPCC, n.d.). Despite the emergence of a substantial body of international research in recent years examining the behavioural, cognitive, social and emotional implications of early screen exposure (GUS, 2022; Genimon Vadakkemulanjanal et al., 2022; McArthur et al., 2022; Mallawaarachchi et al., 2022, 2024, 2025; Wan et al., 2021), there remains limited policy development or commissioned research specific to Scotland. Although the UK Parliament Education Committee (2024) has investigated screen time and its potential links to wellbeing and educational outcomes, no equivalent Scottish policy initiative has yet been undertaken. This absence is particularly significant given reports that Scottish schools experience higher levels of violence and serious disruptive behaviour than their counterparts in England (Wilde, 2025). As existing national behaviour strategies focus primarily on classroom management, inclusion and mental health (Scottish Government, 2023; Scottish Government, 2024), the relationship between early digital exposure and later behavioural outcomes remains underexplored within Scottish policy discourse.

2.5 Relevance

The convergence of rising early years screen use (Byrne, 2021) and increasing behavioural challenges in Scottish primary schools (Scottish Government, 2023) makes this enquiry both timely and socially significant. Rapid digitalisation, cultural normalisation of screens (Postman, 1992; OECD, 2025), and observed difficulties in executive functioning and self-regulation (Wan et al., 2021; Santos et al., 2022) underscore the developmental stakes. Additionally, the gap between early years guidance and school behaviour policies signals an urgent need for integrated, evidence-informed approaches. Investigating how early screen use relates to later classroom behaviour can inform policy, parenting strategies, and educational practice, providing insight into a critical contemporary challenge.

3. Methodology

3.1 Introduction

This chapter outlines the methodological framework underpinning this qualitative, literature-based enquiry, detailing the philosophical stances guiding the study. It will then introduce the thematic analysis approach followed by the specific literature search strategy and process of data analysis. Finally, ethical considerations relevant to the study are briefly discussed.

3.2 Research Philosophy

Recognising the philosophical stance underlying any research is essential, as these beliefs shape the interpretation of knowledge and reality within the enquiry (Clough & Nutbrown, 2012; Bell et al., 2014). This study adopts an interpretivist paradigm, which assumes that reality is socially constructed and best understood through the meanings individuals and societies assign to their experiences (Cohen et al., 2018). Given the focus on understanding complex social and behavioural trends surrounding screen use and individual child development, this paradigm provides an appropriate lens through which to interpret the literature. From a relativist ontological position, the study recognises that concepts such as 'screen time and 'behaviour crisis' are not fixed or unanimously defined, but are constructed differently across the realities of educational, social, and cultural contexts (O'Leary, 2017). Aligned with this ontology, a subjectivist epistemology underpins the research, identifying that knowledge is produced through interpretation of existing texts rather than objective measurement (O'Leary, 2017). Together, these positions justify an interpretivist engagement with literature, allowing for the nuanced exploration of how scholars construct and understand the relationship between screen time and behaviour in primary education.

3.3 Investigative Approach

This qualitative enquiry adopts a narrative review as its primary investigative approach, chosen for its suitability in exploring multi-faceted topics where research is conceptually diverse and methodologically varied (Sukhera, 2022). A narrative review allows for critical, interpretive engagement with the existing literature (Gregory & Denniss, 2018), enabling this enquiry to weave together findings about what is currently known, and what remains uncertain in an answer to the research question (Sukhera, 2022).

Within this broader narrative review, a thematic approach is taken to the data analysis, supporting the organisation and interpretation of literature (Guest et al., 2014; Nowell et al., 2017). Applied to academic discourse, by providing a structured way of identifying recurring ideas and points of divergence, this helps illuminate the shared narratives that shape the field (Braun & Clarke, 2006; Guest et al., 2014).

Taken together, these approaches support the enquiry's philosophical stance by positioning the synthesis of studies and themes identified as actively interpreted through the researcher's engagement with literature (Guest et al., 2014; Sukhera, 2022).

3.4 Search Strategy

The literature search began with scoping searches in Google Scholar using natural language phrases (see KS1-3, Appendix 3), to gain an initial understanding of the breadth of available literature and determine the feasibility and focus of the research topic (Booth et al., 2016). Initial searches revealed a very large pool of results but limited studies specifically focused on Scotland. While some articles from the first two pages provided useful background reading, it became evident that a broader, international perspective would be necessary to identify relevant studies and later situate the findings within a Scottish context. This decision ensured that the study would capture an understanding of global trends in screen use and behaviour while addressing the evident gap in Scotland based research.

To refine the process, prior learning from the MA3 research module was drawn upon to develop more systematic search strings. The initial use of Boolean operators was imprecise, harvesting excessive results (see KS4-5, Appendix 3). To improve the rigor and reproducibility of the search, methodological guidance was reviewed and applied 'AND' to combine concepts, 'OR' to include synonyms, and bracketed grouping to manage scope and logical relationships between search terms (Cherry et al., 2017). To ensure comprehensive coverage, a synonym grid was also developed (see Appendix 2) to map alternative terms for each key concept in the research question: relationship, screen time, early years, and behaviour. This was to enhance the precision and inclusivity of the search, ensuring that relevant variations in terminology were captured (Oliver, 2012).

Using this grid, two search strings were constructed, the second more refined than the first (see KS6-7, Appendix 3), and tested them across three databases: University of Dundee Library Search (UoD LLS), ERIC, and Scopus. These databases were selected because they collectively provide extensive coverage of educational, psychological, and social science research. Google Scholar was excluded at this stage due to its inconsistency and lack of reproducibility. Both versions of the string were evaluated for the number and quality of results retrieved. This iterative testing allowed for progressive refinement, improving the relevance and manageability of the search results (Hart, 2025). The final version of the search string (see KS7, Appendix 3) produced the most balanced and contextually appropriate set of results across all databases and therefore formed the foundation of the literature base.

To further ensure quality and focused, a structured inclusion and exclusion strategy was applied (see Appendix 1). This step was undertaken to clearly define the scope and boundaries of the literature (Booth et al., 2016; Petticrew & Roberts, 2006). Criteria included publication date, language literature type, and relevance to the research question. To maintain validity and credibility, only peer reviewed empirical and discursive texts were considered (Guest et al., 2014), alongside relevant policy documents providing contextual grounding. Furthermore, only literature published from 2020 onwards was included due to the rapid change in the use of digital technologies since the COVID-19 pandemic (UK Parliament, 2021), meaning anything prior is no longer an accurate depiction of current screen time. Criteria were applied using database filtering tools, and the number of results before and after application was recorded (see Appendix 3).

Once the database filtering was complete, the screening process was carried out. First by title, then by abstract, and finally by full-text review, titles unrelated to the research question were excluded, followed by abstract review to further assess relevance. Full-text screen was reserved for studies meeting all inclusion criteria. A flow diagram was used to document the number of studies at each stage (see Appendix 4), enhancing the transparency and traceability of the review process in line with best practice for systematic reviews (Cherry et al., 2024). Additionally, manually identified readings, such as key policy documents and background literature, were incorporated if they met the inclusion criteria. Grey literature was purposively hand-selected to ensure that relevant policy perspectives were included, allowing internationally derived evidence to be interpreted and grounded within the Scottish policy and practice context (Paez, 2017). This systematic process resulted in a final, carefully curated set of studies to form the evidence base for the enquiry.

3.5 Data Analysis Process

Following Braun and Clarke's (2006) approach to thematic analysis, the process was initiated with close, repeated readings of all selected studies to ensure deep familiarisation with the data which is essential for developing an inductive, nuanced understanding. During this stage, detailed notes were created, as early note taking supports reflexivity and helps trace the development of ideas (Guest et al., 2014). These notes were organised into a table containing key summary points and illustrative quotes from each study to provide a transparent audit trail and to ensure that interpretations remained firmly grounded in the original data (Nowell et al., 2017).

The evidence was then mapped and initial patterns identified, recording emerging ideas in a notebook. This step aligns with Braun and Clarke's (2006) first phase of generating initial codes, where early pattern seeking helps sensitise the researcher to potential areas of meaning. Using a mind map (see Appendix 5), all ideas were reviewed and developed, and sorted into core themes and subthemes. This supported the visual exploration of relationships between concepts, facilitating iterative, non-linear thinking that is central to thematic analysis (Guest et al., 2014).

A colour coding system was created using one colour per core theme and related shades for subthemes (see Appendix 6), and this was applied across all notes to refine, compare and clearly document the thematic structure (see an example in Appendix 7), in line with Braun and Clarke's (2006) emphasis on rigorous well evidenced theme development.

3.6 Ethical Considerations

This research is conducted within a rigorous ethical framework that is grounded in academic integrity and respect for intellectual property. This enquiry upholds the principles of ethical scholarship through the accurate representation of ideas and findings, alongside the acknowledgement of original authors through valid and consistent citation (Bell et al., 2024).

Misrepresentation, omission, or selective use of literature undermines the credibility of research and constitutes a breach of ethical responsibility (BERA, 2011; Ramrathan et al., 2016). The use of a

thorough and transparent search strategy prevented this risk by ensuring all relevant literature was identified, evaluated, and represented comprehensively.

Furthermore, literature-based research must remain vigilant to the potential influence of unconscious bias, as personal assumptions can inadvertently shape interpretation (Clough & Nutbrown, 2012). By consciously reflecting on these biases and maintaining that all assertions are authenticated through critical engagement with diverse literature, this study ensures that its conclusions remain fair and balanced, in alignment with the ethical principles necessary in academic enquiry (Cohen et al., 2018).

4. Findings

Across the international literature, a consistent set of developmental and behavioural patterns emerged in relation to early years screen use. Studies report links between rising screen exposure and negative cognitive, social, emotional, psychological and behavioural developmental impacts (Oflu et al., 2021; Orr & Caspi, 2023; Meng et al., 2024; Vasconcellos et al., 2025). Importantly, the evidence suggests that these outcomes relate not only to the quantity of screen time but also the context and quality of children's digital experiences (Bal et al. 2024; Griffith et al., 2024).

These developmental outcomes reflect what is happening to children, while the core themes that emerged from the literature offer insight into why early years screen use negatively affects development, and the subthemes illuminate the specific mechanisms that explain how screen time plays a part in the process.

The first core theme concerns neurological effect of screen use, drawing on evidence that early screen exposure interferes with highly malleable brain structure when it is undergoing its most rapid developmental changes (Huang et al., 2024; Hutton et al., 2022, 2024; Zhang et al., 2022). The second theme is the displacement of early experiences, suggesting that screen use substitutes activities that are fundamental to healthy child development. (Griffith et al., 2024; Panjeti-Madan & Ranganathan, 2023; Radesky et al., 2023). The third theme centres on the content consumed, emphasising how specific content characteristics can shape behavioural tendencies (Bal et al., 2024; Fitzpatrick et al., 2023; McNeill et al., 2023). The literature also highlights an additional theme of parental mediation as a powerful moderator of screen-use effects (Fitzpatrick et al., 2023; Mallawaarachchi et al., 2024; Vadakkemulanjanal, 2022). However, because it cuts across all three themes and constitutes a substantial area of study in its own right, it sits beyond the scope of this enquiry and is not examined as a standalone theme.

Although these themes offer insight into how early screen use may shape development, none of the reviewed studies were conducted in Scotland, leaving a gap in understanding of the Scottish context. The following discussion therefore considers how the three key mechanisms identified internationally interact with Scotland's early years frameworks and teacher-reported trends, to explore the relationship between early years screen time and the Scottish behaviour crisis.

5. Discussion

5.1 Neurological Effects

5.1.1 Introduction

Early childhood is a period of exceptional neurological vulnerability during which neural circuits supporting attention, language, emotional regulation and executive functioning undergo rapid, experience-dependent development (Fitzpatrick et al., 2023; Radesky et al., 2023; Yamato et al., 2023). A consistent trend across neuroimaging and behavioural studies links high or dysregulated screen exposure with differences in the development of these neural systems (Emond et al., 2024; Hutton et al., 2024; Zhang et al., 2022). Although not demonstrating direct causation, this correlation offers insight into how early digital experiences may shape behavioural patterns later observed in school.

5.1.2 Neuroplasticity

Ages 0-5 are marked by exceptionally high neuroplasticity, during which neural circuits supporting attention, language and socio-emotional functioning are rapidly formed and refined (Bustamante et al., 2023; Pyne et al., 2025; Yue et al., 2025). Brain imaging studies show that the brain doubles in size in the first year and reaches around 80% of its adult volume by age two, with synaptic growth and pruning shaping the networks that underpin later cognitive development (Hoehe & Thibaut, 2020; Huang et al., 2024; Hutton et al., 2024). Because these processes are strongly experience-dependent, environmental conditions, including the nature and quantity of digital media exposure, can influence both the pace and organisation of emerging brain networks (Huang et al., 2024).

A growing body of longitudinal and neurophysiological research suggests that substantial screen use during infancy may alter typical developmental trajectories (Ayaz et al., 2025; Huang et al., 2024; Hutton et al., 2022, 2024; Vasconcellos et al., 2025). In fact, screen time at 12 months is associated with atypical neural activity and poorer cognitive and language outcomes by age two (Fitzpatrick et al., 2023), and further screen exposure at ages two and three similarly predict delays in communication, motor and social milestones at five (Yamamoto et al., 2023). Others

identify differences in connectivity in regions involved in emotion processing and cognitive control (Yamamoto et al., 2023; Zhang et al., 2022), indicating that heavy screen use may accelerate or redirect network maturation in ways that constrain later socio-emotional development.

This evidence is particularly relevant in Scotland, where Realising the Ambition (RtA) assumes that children enter early learning settings having benefited from relational, sensory and conversational experiences that support the growth of self-regulation and emotional understanding (Education Scotland, 2020). If, instead of engaging with these experiences, children spend periods of heightened neuroplasticity predominantly occupied with screens, the shaping of neural networks may be altered in ways that differ from typical relational developmental pathways (Hutton et al., 2022; Huang et al., 2024). Scottish teachers' reports of pupils struggling with emotional expression, turn-taking and everyday frustrations (Scottish Government, 2023) can therefore be interpreted not simply as behavioural challenges but as markers of disrupted early neurodevelopment.

5.1.3 White Matter

A second strand of evidence concerns the development of white matter tracts, which are the brain's communication pathways. They are bundles of insulated nerve fibres that carry messages between different brain areas so they can work together efficiently, supporting language, working memory, attention control, and self-regulation (Bal et al., 2024; Fitzpatrick et al., 2023). Neuroimaging studies report lower microstructural integrity in white matter tracts among preschoolers with higher screen time, affecting tracts linked to early literacy and cognitive flexibility (Bal et al., 2024; Cerniglia et al., 2021; Fitzpatrick et al., 2023; Hoehe & Thibaut, 2020; Hutton et al., 2022; 2024).

Behavioural studies similarly show that greater screen use in the first three years predicts weaker working memory, lower cognitive scores, and more ADHD-like behaviours at age 5 (AlQurashi et al., 2025; Hill et al., 2020; Radesky et al., 2023; Rai et al., 2023; Zhang et al., 2022). Excessive screen time is therefore unfavourably associated with executive functions crucial for academic performance and school readiness.

These findings are highly relevant to the Scottish primary classroom. CfE emphasises sustained attention, following instruction, planning and collaboration (Education Scotland, 2017), while RtA foregrounds self-regulation and early executive skills as essential for engagement in play-based pedagogy (Education Scotland, 2020). Many pupils may arrive below these expectations due to reduced white-matter integrity, consistent with teacher reports of rising concentration difficulties, task avoidance and routine-following challenges (Scottish Government, 2023).

However, this is not evidence that screen exposure is the sole determinant of executive functioning but one environmental factor influencing cognitive-control maturation (Huang et al., 2024). In systems where early frameworks assume emerging executive skills, any disruption to these developmental processes likely intensifies behavioural challenges (Education Scotland, 2020).

5.1.4 Dopamine Systems

A further mechanism involves digital media's stimulation of reward circuitry. Platform features such as rapid scene changes, bright colours, sound effects, interactive touchscreens are designed to trigger dopamine release (Emond et al., 2024; Eric, 2021). Prolonged exposure is associated with patterns of engagement that resemble behavioural addictions (Rocha et al., 2023; Al Mossawi et al., 2024). Children quickly learn that digital devices deliver immediate pleasure and novelty, and the brain logs this association, increasing the drive to return to screens and making other activities feel less rewarding (Al Moussawi et al., 2024).

This pattern can deplete the executive resources needed for self-regulation and sustained attention (Emond et al., 2024; Radesky et al, 2023; Zhang et al., 2022). After intense use, children may be left in a cognitively and emotionally depleted state which makes transition away from devices difficult, increasing the likelihood of emotional outbursts when limits are imposed (Cerniglia et al., 2021; Emond et al., 2024). Some may exhibit craving-like behaviours and persistent demands for devices, especially younger children who lack alternative regulation strategies (Vadakkemulanjana, 2022).

In classrooms, these neurological dynamics appear as impulsivity, low persistence, irritability and difficulty with delayed gratification (Choi et al., 2021; Kim & Chung, 2023). Scottish Government (2023) reports rising frustration, impulsive outbursts and reduced task engagement. When children with depleted executive functioning who are used to rapid digital reward cycles experience the slower,

effortful and often less immediately rewarding nature of school learning, they may experience it as dull or overly demanding (Radesky et al., 2023; Zhang et al., 2022). Dopamine-system findings therefore provide a plausible neurobiological explanation for increased novelty-seeking and difficulty settling in Scottish pupils.

5.1.5 Conclusion

Early screen time interferes with heightened neuroplasticity (Huang et al., 2024), shapes white-matter integrity (Hutton et al., 2022), and influences reward systems in ways that increase behavioural vulnerability (Emond et al., 2024). These neurological effects manifest as inattention, task avoidance, restlessness and emotional outbursts, precisely the behaviours Scottish teachers report rising since 2016 (Scottish Government, 2023).

Such trajectories conflict with RtA and CfE's expectation of emerging self-regulation, language competence and independence at school entry (Education Scotland, 2017; Education Scotland, 2020). When early digital environments compromise these foundations, pupils are inevitably more likely to struggle with curriculum and behavioural expectations.

Although the evidence does not establish simple causation, it strongly indicates that screen exposure is a significant environmental factor within a wider network shaping behaviour. The neurological perspective provides the foundation for analysing displacement as a further mechanism linking early screen exposure and behavioural outcomes.

5.2 Displacement of Early Experiences

5.2.1 Introduction

While neurological explanations focus on how screens directly shape neural development, displacement theory highlights the developmental opportunities lost when screen time occupies substantial portions of a young child's day (Eric, 2021; Fitzpatrick et al., 2023). Across the literature, foundational experiences such as language-rich interactions, co-regulation, play, and opportunities to practise emerging executive skills, appear particularly vulnerable to displacement (Meng et al., 2024; Ponti, 2023; Rocha et al., 2023). Missing these experiences accumulates over time, leaving children with fewer chances to rehearse the behaviours, and regulatory strategies anticipated by Scotland's early years frameworks (Education Scotland, 2020). Displacement therefore offers a powerful line to interpret behavioural vulnerabilities now emerging in Scottish primary schools.

5.2.2 Parent-Child Interaction

One of the most consistent findings is the displacement of parent-child interaction during screen use (Al Moussawi et al., 2024; Bal et al., 2024; Brauchli et al., 2024; Rai et al., 2023). When screens are present, whether watched or playing in the background, the quantity and quality of conversation declines (Oflu et al., 2021; Yang et al., 2024). Shared attention episodes, crucial for vocabulary and social-emotional learning, also occur less frequently (Ayaz et al., 2025; Wu et al., 2025).

These exchanges are where children learn to interpret intentions, read emotional cues, practise turn-taking, and refine the language tools needed for self-expression (Al Moussawi et al., 2024; Bal et al., 2024; Orr & Caspi, 2023). When these are diminished, children may struggle to verbalise needs or emotions, relying instead on behaviour to communicate feelings (Bilgin et al., 2025; Vanderloo et al., 2022). This aligns with Scottish teacher reports of pupils with difficulty articulating feelings and increased reliance on adults for conflict resolution (reference).

While contextual pressures can reduce interaction, screens introduce an additional, often subtle disruption: parents may be physically present but mentally diverted, and children may hear speech without receiving directed language (Bal et al., 2024; Brauchli et al., 2024). It is this micro-level erosion of interaction that the literature identifies as particularly consequential for later behaviour.

5.2.3 Play

Play is a primary vehicle for early learning (Education Scotland, 2020). Imaginative play develops social and emotional understanding (Ayaz et al., 2025); active play strengthens motor coordination and sensory integration (McNeill et al., 2021; Monteiro et al., 2021); peer play supports compromise and conflict resolution (Vadakkemulanjanal, 2022). Collectively, these experiences underpin self-regulation and competence- skills emphasised in RtA and foundational for CfE's collaborate learning expectation (Education Scotland, 2017; Education Scotland, 2020).

However, high levels of screen use, especially passive content, frequently displace time that would otherwise be spent in such play (Ayaz et al., 2025; Panjeti-Madan & Ranganathan, 2023; Pyne et al., 2025). Children who spend prolonged periods with screens may have fewer opportunities to practise frustration tolerance, problem-solving, or social navigation (Vasconcellos et al., 2025; Wu et al., 2025).

When these children enter Scottish primary classrooms, teachers often observe difficulties that resemble reduced play exposure like impulsivity, poor turn-taking, limited ability to cope with losing

or waiting, and reduced perseverance during open-ended activities (Scottish Government, 2023). These behavioural challenges are not unexpected- they reflect developmental processes that have not been fully rehearsed.

5.2.4 Screens as Emotional Regulators

A substantial thread in the literature concerns the use of screen time as pacifiers (Griffith et al., 2024; Gueron & Gordon-Hacker, 2020). Parents use screens to manage distress, boredom or transitions, but this displacement of co-regulation may undermine the development of children's independent emotional regulation (Rocha & Nunes, 2020; Vasconcellos, 2025). Children who are routinely calmed with screens become more reliant on external stimulation and less capable of managing arousal or recovering from upset (Panjeti-Madan & Ranganathan, 2023; Pyne et al., 2025).

These patterns mirror the emotional volatility described in Scottish classrooms: pupils who escalate quickly, shut down under pressure or struggle to tolerate small challenges (Scottish Government, 2023). Research consistently links reliance on screen soothing to poorer self-regulation and more externalising behaviours (Hill et al., 2020; Kiing et al., 2024; Mallawaarachchi et al., 2025). When screens substitute relational calming, children miss repeated opportunities to learn how to identify emotions, use language to seek comfort or practise recovery with adult support (Bal et al., 2024; Gueron & Gordon-Hacker, 2020). The result is school aged children who don't have coping strategies, thus increasing dysregulated behaviour (Bal et al., 2024; Cerniglia et al., 2021).

In continuum with this, Scottish Government (2023) documents a rise in distressed behaviour and difficulties coping with everyday demands, reflecting the emotional lability linked to screen-soothing practices. These behaviours are therefore not isolated incidents but downstream effects of a regulatory system that has not learnt how to self-regulate without the instant soothing gratification of devices.

5.2.5 Reduced Executive Functioning Practice

Executive functions are the skills that enable attention, remember instructions, and inhibit impulses (McNeill et al., 2021; Radesky et al., 2023). They develop through repeated experiences of trial-and-error problem solving, managing challenges without immediate rewards, and effortful play (Ponti, 2023).

High screen exposure reduces children's engagement in these cognitively demanding activities (Bal et al., 2024; Radesky et al., 2020). Passive viewing replaces tasks requiring planning or persistent thinking

with low effort, highly stimulating input (Bustamante et al., 2023; Orr & Caspi, 2023; Radesky et al., 2023). This displacement is continuously linked to weaker working memory, reduced inhibitory control, and inability to sustain attention (Oflu et al., 2021; Orr & Caspi, 2023; Panjeti-Madan & Ranganathan, 2023; Ponti, 2023; Wu et al., 2025). Consequently, children may respond impulsively or struggle to persist with effortful or unfamiliar tasks due to the depletion of executive resources (Emond et al., 2024; Monteiro et al, 2022; Radesky et al., 2023).

The task avoidance and short attention spans highlighted by teachers (Scottish Government, 2023) are consistent with the profile of children whose executive systems have had fewer opportunities to develop effectively (Radesky et al., 2023). Behaviours that appear as defiance may instead reflect genuine cognitive vulnerabilities shaped by early digital environments.

5.2.6 Conclusion

Across the literature, displacement theory emerges as a significant pathway through which early screen exposure may contribute to Scotland's behaviour crisis. Reduced opportunities for social interaction, varied play and early regulation practice hinder children's language, social competence and executive functioning (Kim & Chung, 2023; Radesky et al., 2023; Vascobcellos et al., 2025), all underpin behavioural readiness for school (Zhang et al., 2022). These gaps align closely with the rising peer conflict, emotional volatility, inattention, and task avoidance documented in Scottish Government (2023).

5.3 The Role of Content

5.3.1 Introduction

Across the international literature, a central message is that the developmental impact of screen use depends not only on how long children spend with digital media, but on what they consume and how they engage with it (Bal et al. 2024; Griffith et al., 2024; Rocha & Nunes, 2020). Content operates as a distinct mechanism because it shapes the pace, sensory intensity, social nature and emotional tone of children's experiences. It also intersects with the neurological and displacement pathways previously discussed, meaning that content is both a mechanism in its own right and an amplifier of wider developmental influences. This adds further nuance to debates around screen time: reducing minutes alone is unlikely to mitigate risks if inappropriate, overstimulating or solitary content remain routine

(Fitzpatrick et al., 2023; Ponti, 2023; Wu et al., 2025). Understanding content patterns is therefore essential to interpreting current behaviour trends in Scottish primary classrooms, where teachers report rising distractibility, agitation and aggression (Scottish Government, 2023).

5.3.2 Passive versus Active Engagement

A large body of research distinguishes between passive screen use, such as television or video streaming platforms, and active digital engagement, such as interactive apps that require problem-solving or communication (Bal et al., 2024; Vanderloo, 2022; Yue et al., 2025; Zhang et al., 2022). Passive viewing is repeatedly associated with weaker expressive and receptive language and reduced parent-child conversational turns (Bal et al., 2024; Gueron-Sela & Gordon Hacker, 2020). These findings are partly explained by cognitive load: passive content demands little active participation, allowing children to scroll without dedicating attention or utilising executive functioning skills (Fitzpatrick et al. 2023).

However, when interactive apps or educational games are used in short, supervised bursts and co-viewed with adults, they can prompt joint attention or require children to follow sequences of instructions (Busamante et al., 2023; Hutton et al., 2024; Kiing et al., 2024). These benefits are dependent on intentional design and adult involvement; without this scaffolding interactive apps often simply reward rapid responses and reinforce impulsivity (Oflu etal., 2021; Yang et al., 2024).

Studies using both surveys and direct observation indicate that the majority of preschool screen exposure is passive rather than interactive (Panjeti-Madan & Ranganathan, 2023; Rai et al., 2023). Teachers report pupils who are skilled at touchscreen navigation yet struggle with sustained dialogue, collaborative problem-solving or imaginative play (Monteiro et al. 2022), suggesting that children gain technical fluency without parallel development of foundational communicative and cognitive skills.

5.3.3 Fast-Paced, High Intensity Content

The pace and sensory intensity of content are also important predictors of behavioural outcomes (McNeill et al., 2021; Meng et al., 2024; Wu et al., 2025). Many contemporary digital platforms, particularly YouTube, TikTok, and Reels, use rapid edits, highly saturated colours, energetic soundscapes and continuous novelty to maintain engagement (Emond et al., 2024). Repeated exposure to these formats may normalise rapid shifts in attention, conditioning children to seek

constant stimulation- contributing to scanning behaviour and reduced tolerance for boredom or delayed gratification (Meng et al., 2024).

However, susceptibility to overstimulating content is not uniform. Children with emerging ADHD traits or sensory processing differences may be more sensitive to the negative effects (Al Moussawi et al., 2024; AlQuarshi et al., 2025). Socio-economic pressures also shape exposure patterns, with families under more pressure likely to rely on rapidly engaging content (Bal et al., 2024; Kerai et al., 2022), making it difficult to separate environmental drivers from content effects. Nevertheless, the significance between international findings and Scottish behaviour trends strengthens the plausibility of fast paced, overstimulating content as a contributing mechanism (Scottish Government, 2023; Emond et al. 2024).

5.3.4 Age-Inappropriate Content

A second content dimension is exposure to violent or developmentally inappropriate material. Such media is associated with higher levels of externalising behaviours such as aggression, defiance and desensitisation to violence (Griffith et al., 2024; Monteiro et al., 2021; Ponti, 2023). Children frequently access unregulated media and autoplay streams where ranking algorithms are surfacing ever more extreme material (Eric, 2021). This predicts later antisocial behaviour and fear that manifests in internalising symptoms like anxiety or depressive disorders (Kim & Chung, 2023). However, research shows that when age-inappropriate content was swapped for prosocial material, preschoolers social behaviour improved, suggesting that content is a modifiable risk factor, not an unalterable part of the digital environment (McNeill et al., 2021).

Teachers and parents report children using adult language, mimicking online conflict and demonstrating more volatile, reactive responses to frustration (Monteiro et al., 2022). These trends echo the rise in verbal and physical aggression documented in Scottish behaviour survey (Scottish Government, 2023). Crucially, several studies emphasise bidirectionality: children with early regulatory problems or pre-existing negative temperaments both receive more screen exposure and are more vulnerable to its adverse effects (Bilgin et al., 2025; Radesky et al., 2023; Rocha et al., 2023; Vasconcellos et al., 2025). This indicates that unregulated content interacts with, and intensifies pre-existing challenges in children already requiring support.

5.3.5 Educational Content

Educational content is frequently presented to families as developmentally beneficial, yet evidence in this area is ambiguous. High-quality programmes such as Sesame Street stand out in large cohort

studies for supporting vocabulary, phonological awareness and early numeracy, largely due to the careful pacing and coherent narrative structures (Veziroglu-Celik et al. 2023; Vasconcellos et al., 2025; Yang et al., 2024).

However, the most apps and videos marketed as educational do not follow these principles: many replicate entertainment formats, relying on gamified incentives and reward-heavy designs (Rai et al., 2023). Research shows that most require minimal cognitive effort, rarely prompting reasoning or language use (Fitzpatrick et al., 2023; Rai et al., 2023; Rocha & Nunes, 2020). Thus, parents may believe their child is engaging in learning when, in practice, the experience more closely resembles overstimulating passive entertainment.

This ambiguity complicates Scotland's digital strategy. Initiatives such as 1:1 device schemes aim to promote digital inclusion (Midlothian Council, 2024), yet without national guidance on content quality or expectations for home use, devices may also facilitate access to low-quality or developmentally inappropriate content outside school hours (Rai et al., 2023). Local authorities highlight academic benefits of digital tools but make little reference to monitoring digital consumption (Midlothian Council, 2024). In the absence of a kitemarking system or regulated early-years media standards, families must navigate an overwhelming and poorly regulated market, increasing the likelihood that children engage more with developmentally harmful content than truly educational apps (House of Commons Education Committee, 2024).

The resulting tension between CfE's assumptions about children's readiness for curiosity-driven, communicative and collaborative learning, and the habits shaped by early exposure to unregulated content helps explain why teachers report weaker attention, reduced persistence and limited expressive language.

5.3.6 Conclusion

The literature demonstrates that not all screen time has the same developmental influence. Content type, pacing, and social context shape children's behavioural readiness in distinct ways (Rocha & Nunes, 2020). Fast-paced and sensationalist media undermines sustained attention and emotional regulation (Fitzpatrick et al., 2023); violent content amplifies aggression and reactivity (Monteiro et al., 2021); passive viewing limits opportunities for language and regulatory learning (Bal et al., 2024); and low-quality educational content offers little cognitive value while reinforcing rapid reward cycles

(Rai et al., 2023). These mechanisms align closely with the behavioural patterns increasingly visible in Scottish primary schools (Scottish Government, 2023), suggesting that content, not simply quantity, should be central to policy and practitioner conversations.

5.4 Synthesis of Scottish Context

Although the mechanisms discussed above cannot explain Scotland's behaviour crisis in isolation, together they offer a coherent framework for understanding the developmental vulnerabilities now visible in primary classrooms. The challenges associated with early screen exposure closely resemble the patterns documented in Scottish Government (2023) and described by Scottish teachers. This alignment becomes particularly significant when considered alongside the developmental assumptions embedded in *R*tA and *CfE*, which plan to build on emerging self-regulation skills, children's communication competence and the capacity to engage in sustained play and learning (Education Scotland, 2020).

Importantly, early screen use interacts with other pressures shaping children's behaviour in Scotland. Rising poverty, the widening attainment gap, strains on ASN provision, and the residual impact of the COVID-19 pandemic all contribute to heightened behavioural complexity (Scottish Government, 2023). Within this wider ecological context, international evidence suggests that high early screen exposure may amplify pre-existing vulnerabilities, further reducing behavioural readiness for school and intensifying distressed or disruptive responses to everyday demands (Huang et al., 2024; Kerai et al., 2022; Vasconcellos et al., 2025).

These findings point towards a relationship between the rise in early years screen time and Scotland's behaviour crisis that is complex, indirect and mediated through multiple developmental pathways. Screen exposure does not operate as a single causal agent, instead, it shapes children's behavioural trajectories through interconnected neurological influences, displacement of key early experiences, and content effects (Fitzpatrick et al., 2023; Griffith et al., 2024; Hutton et al., 2024). These pathways affect capacities central to CfE, attention, emotional regulation, executive functioning and social skills, helping to explain why so many teachers report difficulties in these domains (Scottish Government, 2023; Education Scotland, 2017).

While the literature cannot establish firm causation, the union between global research and Scottish classroom experience indicates that early screen exposure is a meaningful contributing factor within a broader pattern of influences. It neither determines outcomes for all children nor accounts for the full complexity of Scotland's behaviour crisis, but it interacts with structural, familial and environmental conditions in ways that appear to shape children's readiness for learning (Scottish Government, 2023; Huang et al., 2024; Kerai et al., 2022).

Early screen time should therefore be understood as one significant component of the developmental ecology affecting Scottish pupils, rather than the primary cause of the behaviour crisis. Recognising screens as part of this wider system invites a more nuanced, evidence-informed approach to policy and practice, one that supports families, strengthens early developmental opportunities, and encourages clearer national guidance on digital use in the early years. Such an approach may help mitigate growing behavioural challenges and better align children's early experiences with the expectations of Scotland's curriculum.

6. Implications

6.1 Research

A major gap highlighted by this enquiry is the absence of Scottish research on under-5s' screen use. Future studies should investigate how Scottish families use screens, the developmental pathways most affected, and how these patterns relate to behaviour and learning in P1. Mixed-methods research involving teachers, parents and health professionals would offer valuable insight. There is also a need for intervention studies evaluating approaches that support families to develop healthy digital habits or enhance children's early play, regulation and language experiences. Understanding what works in the Scottish context is essential if future policy and practice are to be evidence-informed and developmentally grounded.

6.2 Policy

The findings indicate that Scotland lacks clear, evidence-based national guidance on screen exposure for children under five. Policymakers may need to consider how national guidance can better protect the developmental foundations that CfE desires. In light of international bodies' structured recommendations for early screen use (AACAP, 2025; Australian Government, 2025; Eurydice, 2025; WHO, 2019), Scotland may benefit from following these examples to develop guidance grounded in developmental science.

Scotland's broader digital strategy could value closer alignment with child-development evidence. Current policies prioritise digital literacy and access yet make limited reference to developmental vulnerabilities linked to early screen use (Scottish Government, 2021). Future strategies could explicitly safeguard the early years by setting expectations for how devices are used with young children, emphasising relational use, high-quality content and time-limited engagement rather than unrestricted or passive consumption.

Clearer content regulation is also needed. A national kitemarking system for early-years digital media would help families and practitioners identify developmentally appropriate content and avoid overstimulating or low-quality material (UK Parliament Education Committee, 2023), creating more consistent decision-making across homes and early learning settings.

Finally, behaviour policies should recognise early digital exposure as one modifiable factor influencing children's development (OECD, 2024). Embedding digital ecology within behaviour frameworks, health-visitor pathways and early-intervention services could support earlier identification of vulnerabilities and help prevent escalation of dysregulated behaviour upon entry to school.

6.3 Practice

For educators, the findings invite a shift from viewing dysregulated behaviour as primarily wilful non-compliance towards understanding it as, at least partly, a reflection of developmental experiences. Where children show inattention, impulsivity or low frustration tolerance, practitioners might consider early digital habits alongside other ecological factors when planning support (Gueron-Sela & Gordon-Hacker, 2020; Vasconcellos et al., 2025).

In practical terms, findings highlight the importance of embedding rich relational, language and play-based experiences throughout the early years and into P1 (Panjeti-Madan & Ranganathan, 2023, Scottish Government, 2020). Strengthening opportunities for imaginative play, co-regulation, conversational turns and executive-function practice in early learning centres may help compensate for experiences displaced by early digital use at home (Bal et al., 2024; Panjeti-Madan & Ranganathan, 2023; Vasconcellos et al., 2025).

Schools may also consider providing guidance for families at transition points, supporting parents to make informed decisions about content, background screen exposure and the use of devices for calming. This is not about assigning blame but acknowledging that families face considerable pressures, and that small adjustments in routines may support children's readiness for learning (Scottish Government, 2020).

Finally, practitioners should reflect critically on their own use of technology in classrooms (GTCS, 2021; Monteiro et al., 2022). Digital tools can be valuable, but practices that mirror fast-paced or reward-driven screen experiences risk reinforcing the very attentional and regulatory patterns the literature identifies as challenging (Bal et al., 2024; Hutton et al., 2024; Wu et al., 2025).

7. Conclusion

Looking back on this journey, I have discovered that screen use in the early years is a far more layered and consequential topic than I expected. What began as an interest in behaviour expanded into an exploration of neuroscience, family ecology and policy, revealing how strongly early digital habits can shape children's readiness for school.

Personally, this enquiry pushed me to engage deeply with a challenging and sometimes overwhelming topic. The biggest gains have been increased resilience and a strengthened ability to persist when confronted with complexity. I also developed a clearer understanding of how easily behaviour can be misinterpreted when developmental influences are overlooked, alongside a greater empathy for the pressures modern families face when navigating early parenthood and how to incorporate technology into that.

Professionally, I have grown both as a researcher and as a teacher. As a researcher, the most significant gain has been developing confidence in my own academic ability. This enquiry felt less like a university assignment and more like an independent challenge requiring persistence, critical thinking and trust in my own judgement. Through this process, I learned that I am capable of managing a substantial piece of research and contributing thoughtfully to a complex educational issue. As a teacher, this enquiry has deepened my understanding of how early digital experiences shape behaviour, allowing me to interpret dysregulation with greater curiosity and compassion. It has encouraged me to think more developmentally about the challenges children bring into the classroom.

Looking ahead, I would like to continue exploring the broader topic of behaviour through practitioner enquiry and share my findings with colleagues, helping to build more developmentally informed approaches to behaviour and early learning. Following the chapter on neuroscience, my eyes have been opened to a strong interest in the child psychology aspect of behaviour, something I am now considering pursuing further down the line.

Word Count: 8119

References

Al Moussawi, I., Bendak, L., Ziab, H. (2024) '"Virtual Autism" and Excessive Screen Exposure in Children Aged 0-3 Years: A Cross-sectional Study in the Lebanese Context' *International Journal of Pediatrics and Adolescent Medicine*, Vol 11(4), pp. 116-127. DOI: 10.4103/IJPAM.IJPAM_109_24

AlQurashi, F.O., Almensif, F.S., Alkhabbaz, F.H., Alkhawahir, K.Y., Abalkhail, D. (2025) 'Screen Time Matters: Exploring the Behavioral Effects of Devices on Saudi Children', *International journal of environmental research and public health*, Vol 22(5), p. 741. Available at: https://doi.org/10.3390/ijerph22050741 (Accessed 08/10/25)

American Academy of Child and Adolescent Psychiatry (2025) *Screen time and children* [online] Available at: https://www.aacap.org/AACAP/Families_and_Youth/Facts_for_Families/FFF-Guide/Children-And-Watching-TV-054.aspx (Accessed 19/09/25)

Atkins, J.B., Difulvio, S., Boneh, J., Myers, R., Tohic, C., Dickson, C., Pena, D., Simanton, E. (2024) 'Exploring the Link Between Early Technology Exposure and Developmental Milestones in Childhood', *Curēus*, Vol 16(10), p. e71791. Available at: https://doi.org/10.7759/cureus.71791 (Accessed 08/10/25)

Australian Government (2025) *Driving Australia's digital future: 2025 Implementation Plan*. [online] Available at: https://www.dta.gov.au/media-releases/driving-australias-digital-future-2025-implementation-plan (Accessed 16/12/25)

Ayaz, M., Juriasinghani, M., Punshi, M., Kundi, F.K., Nasir, M., Durrani, H.M., Gbamgbola, T.A., Sarwar, B. (2025) 'Exploring the Relationship between Screen Time and Developmental Delays in Early Childhood', *Journal of neonatal surgery*, Vol 13(1), pp. 1296–1301. Available at: https://doi.org/10.63682/jns.v13i1.9222 (Accessed 09/10/25)

Bal, M., Kara Aydemir, A.G., Tepetaş Cengiz, G.Ş., Altındağ, A. (2024) 'Examining the relationship between language development, executive function, and screen time: A systematic review', *PloS one*, Vol 19(12), p. e0314540. Available at: https://doi.org/10.1371/journal.pone.0314540 (Accessed 08/10/25)

Barker, L. (2025) 'Outdoor teaching 'cure' for behaviour crisis, says King's former school' *The Times* [online] Available at: https://www.thetimes.com/uk/scotland/article/gordonstoun-head-says-outdoor-education-can-calm-unruly-pupils-g6dtrrkbj (Accessed 01/10/25)

Bell, J., Waters, S., Johnson, H. (2024) *Doing Your Research Project: A guide for first time researchers.* 8th edition. Maidenhead: Open University Press.

BERA (2011) *Ethical Guidelines for Education Research*. London: BERA

Bilgin, A., Sloan, S., Neville, R.D. (2025) 'Is the association between infant regulatory problems and trajectories of childhood co-developing internalizing and externalizing symptoms moderated by early screen media exposure?', *European child & adolescent psychiatry*, Vol 34(7), pp. 2229–2239. Available at: https://doi.org/10.1007/s00787-024-02634-0 (Accessed 09/10/25)

Booth, A. (2016) 'Searching for qualitative research for inclusion in systematic reviews: a structured methodological review.' *Systematic Reviews,* Vol 5 (74), pp. 1-23. Available at: https://doi.org/10.1186/s13643-016-0249-x (Accessed 07/11/25)

Brauchli, V., Sticca, F., Edelsbrunner, P.A., von Wyl, A., Lannen, P. (2024) 'Are screen media the new pacifiers? The role of parenting stress and parental attitudes for children's screen time in early childhood', *Computers in human behavior*, Vol 152(1), pp. 108057. Available at: https://doi.org/10.1016/j.chb.2023.108057 (Accessed 08/10/25)

Braun, V., Clarke, V. (2006) 'Using Thematic Analysis in Psychology.' *Qualitative Research in Psychology*, Vol 3(2), pp. 77-101. Available at: https://doi.org/10.1191/1478088706qp063oa (Accessed 19/11/25)

Brooks, L. (2025) 'Schools in Scotland witness 'exponential increase' in pupil violence' *The Guardian*. 6 February. [online] Available at: https://www.theguardian.com/education/2025/feb/06/scotland-schools-pupil-violence-increase (Accessed 01/10/25)

Bustamante, J.C., Fernández-Castilla, B., Alcaraz-Iborra, M. (2023) 'Relation between executive functions and screen time exposure in under 6 year-olds: A meta-analysis', *Computers in human behavior*, Vol 145(1), pp.107739. Available at: https://doi.org/10.1016/j.chb.2023.107739 (Accessed 08/10/25)

Byrne, R., Terranova, C. O., Trost, S. G. (2021) 'Measurement of screen time among young children aged 0-6 years: A systematic review' *Pediatric Obesity/Behaviour*, Vol 22(8). Available at: https://doi.org/10.1111/obr.13260 (Accessed 09/09/25)

Cambridge Dictionary (n.d.) *Screen Time Definition*. [online] Available at: https://dictionary.cambridge.org/dictionary/english/screen-time (Accessed 28/09/25)

Canadian Pediatric Society (2022) 'Screen Time and Preschool children: promoting health and development in a digital world.' *Pediatric and Child Health*. Vol 28(3), pp. 184-192. Available at: https://cps.ca/en/documents/position/screen-time-and-preschool-children (Accessed 19/09/25)

Cerniglia, L., Cimino, S., Ammaniti, M. (2021) 'What are the effects of screen time on emotion regulation and academic achievements? A three-wave longitudinal study on children from 4 to 8 years of age', *Journal of early childhood research: ECR*, Vol 19(2), pp. 145–160. Available at: https://doi.org/10.1177/1476718X20969846 (Accessed 09/09/25)

Cherry, M.G., Boland, A., Dickson, R. (eds) (2024) *Doing a systematic review: a student's guide*. 3rd edition. London: Sage.

Choi, Y., Lee, D.Y., Lee, S., Park, E. J., Yoo, H.J., Shin, Y. (2021) 'Association between screen overuse and behavioral and emotional problems in elementary school children' *Journal of the Korean Academy of Child and Adolescent Psychiatry.* Vol 32(4), pp. 154-160 DOI: 10.5765/jkacap.210015

Clough, P., Nutbrown, C. (2012) *A Students Guide to Methodology*. 3rd Edition. London: SAGE Publications Ltd.

Cohen, L., Manion, L., Morrison, K. (2018) *Research Methods in Education*. 8th edition. New York: Routledge.

Critcher, C. (2012) 'Screen Savers. Case Histories of Social Reaction to Mass Media, Children and Violence' *Recherches sociologiques et anthropologiques*, Vol 43(1), pp. 59-78. Available at: https://doi.org/10.4000/rsa.841 (Accessed 27/09/25)

Duch, H., Fisher, E. M., Ensari, I., Harrington, A. (2013) 'Screen time use in children under 3 years old: a systematic review of correlates' *International Journal of Behavioural Nutrition and Physical Activity*, Vol 10(102). Available at: https://ijbnpa.biomedcentral.com/articles/10.1186/1479-5868-10-102 (Accessed 09/09/25)

Education Scotland (2020) *Realising the Ambition: Being Me* [online] Education Scotland. Available at: https://education.gov.scot/media/3bjpr3wa/realisingtheambition.pdf (Accessed 11/10/25)

Education Scotland (2017) *Curriculum principles and practice* [online] Available at: https://auth.education.gov.scot/curriculum-for-excellence/principles-and-practice/ (Accessed 11/10/25)

Eirich, R., McArthur, B.A., Anhorn, C., McGuinness, C., Christakis, D.A., Madigan, S. (2022) 'Association of Screen Time With Internalizing and Externalizing Behavior Problems in Children 12 Years or Younger: A Systematic Review and Meta-analysis' *JAMA Psychiatry,* Vol 79(5), pp. 393-405. doi:10.1001/jamapsychiatry.2022.0155

EIS (2024) *Violence & Aggression Branch Survey Report and Campaigning Recommendations: Full Report.* [online] Available at: https://www.eis.org.uk/Content/images/Campaigns/QualityEducation/ViolenceAggressionSurveyReport.pdf (Accessed 27/09/25)

Emond, J.A., Carlson, D., Ballarino, G., Domoff, S.E. (2024) 'Validating the problematic media use measure in preschool-aged children: Associations with children's screen media use, bothersome pestering to use screen media, and emotional self-regulation', *Technology, mind, and behavior*, Vol 5(3). Available at: https://doi.org/10.1037/tmb0000135 (Accessed 09/10/25)

Eric, O. (2021) 'The negative effects of new screens on the cognitive functions of young children require new recommendations', *Italian journal of pediatrics*, Vol 47(223). Available at: https://doi.org/10.1186/s13052-021-01174-6 (Accessed 09/10/25)

Eurydice (2025) *National reforms in early childhood education and care*. [online] Available at: https://eurydice.eacea.ec.europa.eu/eurypedia/sweden/national-reforms-early-childhood-education-and-care (Accessed 16/12/25)

Fitzpatrick, C., Binet, M.-A., Cristini, E., Lopes Almeida, M., Bégin, M., Bitencourt Frizzo, G. (2023) 'Reducing harm and promoting positive media use strategies: new perspectives in understanding the impact of preschooler media use on health and development', *Psicologia, reflexão e crítica*, Vol 36(19). Available at: https://doi.org/10.1186/s41155-023-00262-2 (Accessed 09/10/25)

Genimon Vadakkemulanjanal, J., Thomas, M. A., Sneha, E., Stephiya, V., Jebin, T. (2022) 'The Impact of Screen Time and Mobile Dependency on Cognition, Socialization and Behaviour among Early Childhood Students during the COVID

Pandemic-Perception of the Parents' *Digital Education Review*, Vol 41, pp. 114-123. Available at: https://files.eric.ed.gov/fulltext/EJ1363209.pdf (Accessed 10/09/25)

Gregory, A. T., Denniss, R. A. (2018) 'An Introduction into Writing Narrative and Systematic Reviews- Tasks, Tips and Traps for Aspiring Authors' *Heart Lung and Circulation*, Vol 27(7), pp.893-898. Available at: https://www.heartlungcirc.org/article/S1443-9506(18)30165-3/fulltext (Accessed 07/11/25)

Griffith, S.F., Bagner, D.M., Hart, K.C. (2024) 'Promoting healthy screen use in children with externalizing behavior', *Child development perspectives*, 18(2), pp. 64–72. Available at: https://doi.org/10.1111/cdep.12500 (Accessed 09/10/25)

GTCS (2021) *The Standard for Full Registration.* [online] Available at: https://cdn.prod.website-files.com/653fc30601a80aefd5668009/65de1052167fdf3d4d70eeda_GTCS_The%20Standard%20for%20Full%20Registration.pdf (Accessed 17/11/25)

Gueron-Sela, N., Gordon-Hacker, A. (2020) 'Longitudinal Links Between Media Use and Focused Attention Through Toddlerhood: A Cumulative Risk Approach', *Frontiers in psychology*, Vol11, p. 569222. Available at: https://doi.org/10.3389/fpsyg.2020.569222 (Accessed 08/10/25)

Guest, G., MacQueen, K. M., Namey, E. E. (2014) *Applied Thematic Analysis.* California: SAGE Publications Inc.

Hart, C. (2025) *Doing a literature review: releasing the research imagination*. 3rd edition. London: SAGE Publishers Ltd.

Hill, M.M., Gangi, D., Miller, M., Rafi, S.M., Ozonoff, S.(2020) 'Screen time in 36-month-olds at increased likelihood for ASD and ADHD', *Infant behavior & development*, Vol 61, pp. 101484. Available at: https://doi.org/10.1016/j.infbeh.2020.101484 (Accessed 09/10/25)

Hoehe, M.R., Thibaut, F. (2020) 'Going digital: how technology use may influence human brains and behavior', *Dialogues in clinical neuroscience*, Vol 22(2), pp. 93–97. Available at: https://doi.org/10.31887/DCNS.2020.22.2/mhoehe (Accessed 09/10/25)

Hu, B.Y., Johnson, G.K., Teo, T., Wu, Z. (2020) 'Relationship Between Screen Time and Chinese Children's Cognitive and Social Development', *Journal of Research in Childhood Education*, Vol 34(2), pp. 183–207. doi: 10.1080/02568543.2019.1702600.

Huang, P., Chan, S.Y., Ngoh, Z.M., Ong, Z.Y., Low, X.Z., Law, E.C., Gluckman, P.D., Kee, M.Z.L., Fortier, M.V., Chong, Y.S., Zhou, J.H., Meaney, M.J., Tan, A.P. (2024) 'Screen time, brain network development and socio-emotional competence in childhood: moderation of associations by parent–child reading', *Psychological medicine*, Vol 54(9), pp. 1992–2003. Available at: https://doi.org/10.1017/S0033291724000084 (Accessed 08/10/25)

Hutton, J.S., Dudley, J., DeWitt, T., Horowitz-Kraus, T.(2022) 'Associations between digital media use and brain surface structural measures in preschool-aged children', *Scientific reports*, Vol 12(1), pp. 19095. Available at: https://doi.org/10.1038/s41598-022-20922-0 (Accessed 09/10/25)

Hutton, J.S., Taylor Piotrowski, J., Bagot, K., Blumberg, F., Canli, T., Chein, J., Christakis, D.A., Grafman, J., Griffin, J.A., Hummer, T., Kuss, D.J., Lerner, M., Marcovitch, S., Paulus, M.P., Perlman, G., Romeo, R., Thomason, M.E., Turel, O., Weinstein, A., West, G., Hurst-Della Pietra, P., Potenza, M.N. (2024) 'Digital Media and Developing Brains: Concerns and Opportunities' *Current Addiction Reports.* Vol 11, pp. 287-298. Available at: https://doi.org/10.1007/s40429-024-00545-3 (Accessed 09/10/25)

Judd, T. (2018) 'The rise and fall (?) of the digital natives.' *Australasian Journal of Educational Technology*, Vol 34(5). Available at: https://doi.org/10.14742/ajet.3821 (Accessed 27/09/25)

Kerai, S., Almas, A., Guhn, M., Forer, B., Oberle, E. (2022) 'Screen time and developmental health: results from an early childhood study in Canada', *BMC public health*, Vol 22(1). Available at: https://doi.org/10.1186/s12889-022-12701-3 (Accessed 08/10/25)

Kiing, J.S.H., Kang, Y.Q., Mulay, K.V., Lim, T.S.H., Chong, S.C., Tan, M.Y., Chan, Y.H., Lim, A.S.Y., Aishworiya, R. (2024) 'Screen time and social-emotional skills in preschoolers with developmental, behavioural or emotional issues in Singapore', *Annals of the Academy of Medicine, Singapore*, Vol 53(7), pp. 410–419. Available at: https://doi.org/10.47102/annals-acadmedsg.2023384 (Accessed 08/10/25)

Kim, K.M., Chung, U.S. (2023) 'Emotional and Behavioral Correlates of Exposure to Electronic Media in School-Aged Children: A Prospective Study', *Journal of Korean medical science*, Vol 38(36), p. 283. Available at: https://doi.org/10.3346/jkms.2023.38.e283 (Accessed 09/10/25)

Lee, B., Warner, P. (2022) 'Screen time and early children's emotional, behavioural and social development: Findings from the Growing Up in Scotland (GUS) cohort study', *Research Square* (preprint). Available at: https://doi.org/10.21203/rs.3.rs-1640881/v1 (Accessed 26/09/25)

Ma, S., Li, J., Chen, E. E. (2024) 'Does Screen Media Hurt Young Children's Social Development? Longitudinal Associations between Parental Engagement, Children's Screen Time, and Their Social Competence' *Early Education and Development*, Vol 35(1), pp. 10-25. Available at: https://doi.org/10.1080/10409289.2022.2151401 (Accessed 10/09/25)

Mallawaarachchi, S.R., Anglim, J., Hooley, M., Horwood, S. (2022) 'Associations of smartphone and tablet use in early childhood with psychosocial, cognitive and sleep factors: a systematic review and meta-analysis', *Early childhood research quarterly*, 60, pp. 13–33. Available at: https://doi.org/10.1016/j.ecresq.2021.12.008 (Accessed 10/09/25)

Mallawaarachchi, S., Burley, J., Mavilidi, M., Howard, S.J., Straker, L., Kervin, L., Staton, S., Hayes, N., Machell, A., Torjinski, M., Brady, B., Thomas, G., Horwood, S.,

White, S.L.J., Zabatiero, J., Rivera, C. and Cliff, D. (2024) 'Early Childhood Screen Use Contexts and Cognitive and Psychosocial Outcomes: A Systematic Review and Meta-analysis' *JAMA Pediatrics,* Vol 178(10), pp. 1017-1026. Available at: https://doi.org/10.1001/jamapediatrics.2024.2620 (Accessed 10/09/25)

Mallawaarachchi, S., Anglim, J., Horwood, S. (2025) 'Types and contexts of child mobile screen use and associations with early childhood behavior', *Early childhood research quarterly*, 70, pp. 274–286. Available at: https://doi.org/10.1016/j.ecresq.2024.10.010 (Accessed 10/09/25)

McArthur, B.A., Tough, S., Madigan, S. (2022) 'Screen time and developmental and behavioral outcomes for preschool children' *Pediatric Research,* Vol 91, pp.1616–1621. Available at: https://doi.org/10.1038/s41390-021-01572-w (Accessed 10/09/25)

McNeill, J., Howard, S.J., Vella, S.A., Cliff, D.P. (2021) 'Cross-Sectional Associations of Application Use and Media Program Viewing with Cognitive and Psychosocial Development in Preschoolers', *International journal of environmental research and public health*, Vol 18(4), p. 1608. Available at: https://doi.org/10.3390/ijerph18041608 (Accessed 09/10/25)

Meng, X., Liang, X., Liu, C., Cheng, N., Lu, S., Zhang, K., Yin, Y., Tong, C., Lu, C., Wang, Z. (2024) 'Associations between screen media use and young children's inhibitory control: Evidence from behavioral and fNIRS study', *Computers in human behavior*, Vol 152. Available at: https://doi.org/10.1016/j.chb.2023.108041 (Accessed 09/10/25)

Midlothian Council (2024) *Midlothian Digital Strategy 2024-29 (PDF)* [online] Available at: https://www.midlothian.gov.uk/downloads/file/4226/midlothian_digital_strategy_2024-29_pdf (Accessed 12/10/25)

Monteiro, R., Fernandes, S. and Rocha, N. (2022) 'What Do Preschool Teachers and Parents Think about the Influence of Screen-Time Exposure on Children's Development? Challenges and

Opportunities.' *Education Sciences*, Vol 12(1), p.52. Available at: https://doi.org/10.3390/educsci12010052 (Accessed 08/10/25)

Monteiro, R., Rocha, N.B., Fernandes, S. (2021) 'Are Emotional and Behavioral Problems of Infants and Children Aged Younger Than 7 Years Related to Screen Time Exposure During the Coronavirus Disease 2019 Confinement?', *Frontiers in psychology*, Vol 12, p. 590279. Available at: https://doi.org/10.3389/fpsyg.2021.590279 (Accessed 08/10/25)

NASUWT (2025*) Better Deal on Behaviour (Scotland*). [online] Available at: https://www.nasuwt.org.uk/news/campaigns/better-deal-on-behaviour/better-deal-on-behaviour-scotland.html (Accessed 29/09/25)

NSPCC (n.d.) *Supporting children at different ages with their use in technology.* [online] Available at: https://www.nspcc.org.uk/keeping-children-safe/online-safety/access-to-technology-for-different-ages/ (Accessed 28/09/25)

Nowell, L. S., Norris, J. M., Moules, N. J. (2017) 'Thematic Analysis: Striving to Meet the Trustworthiness Criteria' *International Journal of Qualitative Method*. Vol 16(1), pp. 1-13. Available at: https://doi.org/10.1177/1609406917733847 (Accessed 11/11/25)

OECD (2024) *Children in the digital environment* [online] Available at: https://www.oecd.org/en/topics/sub-issues/children-in-the-digital-environment.html (Accessed 28/09/25)

OECD (2025) *How's life for children in the digital age?* [online] Available at: https://www.oecd.org/en/publications/2025/05/how-s-life-for-children-in-the-digital-age_c4a22655.html (Accessed 28/09/25)

Oflu, A., Tezol, Ö., Yalçın, S., Yildiz, D., Caylan, N., Ozdemir, D.F., Cicek, S., Nergiz, M.E. (2021) 'Excessive screen time is associated with emotional liability in preschool children', *Archivos*

argentinos de pediatría, Vol 119(2), p. 106- 113. Available at: https://doi.org/10.5546/aap.2021.eng.106 (Accessed 09/10/25)

O'Leary, Z. (2017) *The Essential Guide to Doing Your Research Project*. 3rd edition. London: Sage Publications.

Oliver, P. (2012) *Succeeding with your literature review: a handbook for students.* Maidenhead: Open University Press

Orr, E., Caspi, R. (2023) 'The association between media consumption and children's play tendencies and socioemotional skills', *European early childhood education research journal*, Vol 31(3), pp. 437–453. Available at: https://doi.org/10.1080/1350293X.2022.2116655 (Accessed 09/10/25)

Paez, A. (2017) 'Gray Literature: An important resource in systematic reviews' J Evid Based Med, Vol 10(3), pp. 233-240. DOI: 10.1111/jebm.12266

Panjeti-Madan, V.N**.**, Ranganathan, P. (2023) 'Impact of Screen Time on Children's Development: Cognitive, Language, Physical, and Social and Emotional Domains', *Multimodal technologies and interaction*, Vol 7(5), p. 52. Available at: https://doi.org/10.3390/mti7050052 (Accessed 08/10/25)

Petticrew, M., Roberts, H. (2006) *Systematic reviews in the social sciences: A practical guide.* Blackwell Publishing.

Ponti, M. (2023) 'Screen time and preschool children: Promoting health and development in a digital world', *Paediatrics & child health*, 28(3), pp. 184–192. Available at: https://doi.org/10.1093/pch/pxac125 (Accessed 08/10/25)

Postman, N. (1992) *Technopoly: The Surrender of Culture to Technology.* New York: Alfred A. Knopf

Prashanth G. P. (2025) ‘Debate around and impact of digital screen time and media parenting on children's development.’ *Clinical and experimental pediatrics*, Vol 68(7), 551–553. https://doi.org/10.3345/cep.2025.00073 (Accessed 09/10/25)

Prensky, M. (2001) 'Digital Natives, Digital Immigrants Part 1' *On the Horizon, The International Journal of Learning Futures*, Vol 9(5) pp. 1–6. Available at: https://doi.org/10.1108/10748120110424816 (Accessed 27/09/25)

Pyne, B., Asmara, O., Morawska, A. (2025) ‘The Impact of Modifiable Parenting Factors on the Screen Use of Children Five Years or Younger: A Systematic Review’, *Clinical child and family psychology review*, Vol 28(2), pp. 458–490. Available at: https://doi.org/10.1007/s10567-025-00523-9 (Accessed 09/10/25)

Radesky, J.S., Kaciroti, N., Weeks, H.M., Schaller, A., Miller, A.L. (2023) ‘Longitudinal Associations Between Use of Mobile Devices for Calming and Emotional Reactivity and Executive Functioning in Children Aged 3 to 5 Years’, *JAMA pediatrics*, Vol 177(1), pp. 62–70. Available at: https://doi.org/10.1001/jamapediatrics.2022.4793 (Accessed 08/10/25)

Rai, J., Predy, M., Wiebe, S.A., Rinaldi, C., Zheng, Y., Carson, V. (2023) ‘Patterns of preschool children’s screen time, parent–child interactions, and cognitive development in early childhood: a pilot study’, *Pilot and feasibility studies*, Vol 9(1). Available at: https://doi.org/10.1186/s40814-023-01266-6 (Accessed 08/10/25)

Ramrathan, L., Grange, L.L., Shawa, L.B. (2017) ‘Ethics in educational research’, in Ramrathan, L., le Grange, L., Higgs, P. (eds.) *Education studies for initial teacher education*. Cape Town: Juta, pp. 432–443.

Rocha, B., Ferreira, L.I., Martins, C., Santos, R., Nunes, C (2023) 'The Dark Side of Multimedia Devices: Negative Consequences for Socioemotional Development in Early Childhood', *Children (Basel)*, Vol 10(11), p. 1807. Available at: https://doi.org/10.3390/children10111807 (Accessed 09/10/25)

Rocha, B., Nunes, C. (2020) 'Benefits and damages of the use of touchscreen devices for the development and behavior of children under 5 years old—a systematic review', *Psicologia, reflexão e crítica*, Vol 33(24). Available at: https://doi.org/10.1186/s41155-020-00163-8 (Accessed 09/10/25)

Ross, C. (2024) 'Scottish parents threaten 'strike' as school violence crisis leaves them fearing for children' *The Scotsman.* 14 July [online] Available at: https://www.scotsman.com/education/scottish-parents-threaten-strike-as-school-violence-crisis-leaves-them-fearing-for-their-childrens-lives-4696549 (Accessed 01/10/25)

Royal college paediatrics and child health (2019) *The health impacts of screen time: a guide for clinicians and parents.* [online] https://opis-cdn.tinkoffjournal.ru/mercury/kids-psychiatry-doc1.xp3sfr..pdf (Accessed 19/09/25)

Stewart, C. (2025) 'Teacher reveals the truth of behaviour crisis in Scotland's classrooms in weekly diary' *The Scotsman*. 2 November [online] Available at: https://www.scotsman.com/education/teacher-reveals-the-truth-of-behaviour-crisis-in-scotlands-classrooms-in-weekly-diary-5383591 (Accessed 01/10/25)

Santos, R.M.S., Mendes, C.G., Marques Miranda, D., Romano-Silva, M.A. (2022) 'The Association between Screen Time and Attention in Children: A Systematic Review', *Developmental Neuropsychology*, Vol 47(4), pp. 175–192. doi: 10.1080/87565641.2022.2064863

Scottish Government (2021) *A changing nation: how Scotland will thrive in a digital world*. [online] Available at: https://www.gov.scot/publications/a-changing-nation-how-scotland-will-thrive-in-a-digital-world/ (Accessed 12/10/25)

Scottish Government (2023) *Behaviour in Scottish schools: research report 2023* [online] Available at: https://www.gov.scot/publications/behaviour-scottish-schools-research-report-2023/ (Accessed 07/09/25)

Scottish Government (2024) *Relationships and behaviour in schools: national action plan 2024 to 2027* [online] Available at: https://www.gov.scot/publications/national-action-plan-relationships-behaviour-schools-2024-2027/pages/5/ (Accessed 07/09/25)

Sukhera, J. (2022) 'Narrative Reviews: Flexible, Rigorous, and Practical.' *J Grad Med Educ., Vol 14(4), pp. 414-417.* doi: 10.4300/JGME-D-22-00480.1.

Taylor, G.M.J., Kolak, J., Norgate, S., Monaghan, P. (2022) 'Assessing the educational potential and language content of touchscreen apps for preschool children' *Computers and Education Open,* Vol 3, pp.100102. Available at: https://doi.org/10.1016/j.caeo.2022.100102. (Accessed 10/09/25)

UK Parliament Education Committee (2024) *Screen time: impacts on education and wellbeing – Report Summary.* [online] Available at: https://publications.parliament.uk/pa/cm5804/cmselect/cmeduc/118/summary.html#:~:text=Research%20suggests%20a%2052%25%20increase,as%20six%20months%20of%20age (13/09/25)

UK Parliament (2021) How Technology is Accelerating Changes in the Way we Work [online] Available at: https://doi.org/10.58248/HS39 (Accessed 15/12/25)

Vadakkemulanjanal J. G. (2022) 'The Impact of Screen Time and Mobile Dependency on Cognition, Socialization and Behaviour Among Early Childhood Students During the Covid Pandemic- Perception of the Parents'. *Digital Education Review*, Vol 41, pp.114–123. Available at: https://doi.org/10.1344/der.2022.41.114-123 (Accessed 09/10/25)

Vanderloo, L.M., Janus, M., Omand, J.A., Keown-Stoneman, C.D.G., Borkhoff, C.M., Duku, E., Mamdani, M., Lebovic, G., Parkin, P.C., Randall Simpson, J., Tremblay, M.S., Maguire, J.L., Birken, C.S. (2022) 'Children's screen use and school readiness at 4-6 years: prospective cohort study', *BMC public health*, Vol 22(1). Available at: https://doi.org/10.1186/s12889-022-12629-8 (Accessed 08/10/25)

Vasconcellos, R.P., Sanders, T., Lonsdale, C., Parker, P., Conigrave, J., Tang, S., del Pozo Cruz, B., Biddle, S.J.H., Taylor, R., Innes-Hughes, C., Salmela-Aro, K., Vasconcellos, D., Wilhite, K., Tremaine, E., Booker, B., Noetel, M. (2025) 'Electronic Screen Use and Children's Socioemotional Problems: A Systematic Review and Meta-Analysis of Longitudinal Studies', *Psychological bulletin*, Vol 151(5), pp. 513–543. Available at: https://doi.org/10.1037/bul0000468 (Accessed 08/10/25)

Veziroglu-Celik, M., Acar, I.H., Kaygisiz, C., Koc, I.N. (2023) 'A Convergent Parallel Mixed-Methods Study of Screen Time and Social Behaviors in Early Childhood', *Journal of research in childhood education*, Vol 37(4), pp. 506–518. Available at: https://doi.org/10.1080/02568543.2022.2143969 (Accessed 08/10/25)

Wan, M. W., Fitch-Bunce, C., Heron, K., Lester, E. (2021) 'Infant screen media usuage and social-emotional functioning' *Infant Behaviour and Development*, Vol 62. Available at: https://doi.org/10.1016/j.infbeh.2020.101509 (Accessed 09/10/25)

Wu, J.-B., Yang, Y., Zhou, Q., Li, J., Yang, W.-K., Yin, X., Qiu, S.-Y., Zhang, J., Meng, M., Guo, Y., Chen, J.-H., Chen, Z. (2025) 'The relationship between screen time, screen content for children aged 1-3, and the risk of ADHD in preschools', *PloS one*, Vol 20(4), p. e0312654. Available at: https://doi.org/10.1371/journal.pone.0312654 (Accessed 09/10/25)

World Health Organization (2019) *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age*. *World Health Organization.* [online] Available at: https://iris.who.int/server/api/core/bitstreams/60a1cbaa-2bef-4251-9557-e52ce22112b3/content (Accessed 22/09/25)

Yamamoto, M., Mezawa, H., Sakurai, K., Mori, C. (2023) 'Screen Time and Developmental Performance Among Children at 1-3 Years of Age in the Japan Environment and Children's Study', *JAMA Pediatrics*, Vol 177(11), pp. 1168–1175. Available at: https://doi.org/10.1001/jamapediatrics.2023.3643 (Accessed 09/10/25)

Yang, S., Saïd, M., Peyre, H., Ramus, F., Taine, M., Law, E.C., Dufourg, M.-N., Heude, B., Charles, M.-A., Bernard, J.Y. (2024) 'Associations of screen use with cognitive development in early childhood: the ELFE birth cohort', *Journal of child psychology and psychiatry*, Vol 65(5), pp. 680–693. Available at: https://doi.org/10.1111/jcpp.13887 (Accessed 09/10/25)

Yue, A., Liang, S., Peng, F., Gao, Y., Zhang, X., Qiao, N., Song, Q., Shi, Y. (2025) 'The Effect of Screen Exposure on Cognitive and Non-Cognitive Development of Early Childhood in Rural China: A Longitudinal Study', *Early education and development*, Vol 36(7), pp. 1618–1633. Available at: https://doi.org/10.1080/10409289.2025.2484857 (Accessed 08/10/25)

Zhang, Z., Adamo, K.B., Ogden, N., Goldfield, G.S., Okely, A.D., Kuzik, N., Crozier, M., Hunter, S., Predy, M., Carson, V. (2022) 'Associations between screen time and cognitive development in preschoolers', *Paediatrics & child health*, Vol 27(2), pp. 105–110. Available at: https://doi.org/10.1093/pch/pxab067 (Accessed 09/10/25)

Appendices

Appendix 1 – Inclusion & Exclusion Criteria

Category	Inclusion	Exclusion	Justification
Key Sources	Both literature based and empirical works will be considered: reports, books, journal articles, conference papers and dissertations. Additionally, policy documents and curriculum materials related to early years and primary education will be included.	Reviews of books, magazines, instructional materials, bibliographies and visual resources for teaching, incomplete research studies will not be included.	Literature will be based on peer-reviewed empirical research and peer-reviewed discursive texts. Policy documents provide context to the topic.
Language	English	Not English	The focus of the enquiry is on behaviour in Scottish primary schools
Years of Publishing	2020- present	Pre 2020	The type and amount of screen usage has rapidly increased since the covid 19 pandemic, and thus any research regrading technology pre 2020 is not relevant to current circumstance.
Search Engines / Databases	UoD LLS ERIC SCOPUS	Google Scholar	Education databases were chosen because they are directly relevant to the topic. These offer wide enough scope, making the use of Google Scholar unnecessary. In addition, Google Scholar can be inconsistent, as it does not always return the same results for each search.
Key Terms	"screen time" refers to any ~~extra curricular~~ time spent watching any screens. "early years" refers to 0-5. "Impact behaviour" refers to the behaviour of primary age children	Time spent using digital resources in school will be excluded. Behaviour impacts as adolescents will be excluded	The thesis is focused on the impacts of excessive usage of non educational screen time during the early years on the behaviour of the children as they come into primary level.

Appendix 2 – Key Search Term Synonym Grid

Question

What is the relationship between the rise of screen time in the early years screen time and the growing behaviour crisis in Scottish primary schools?

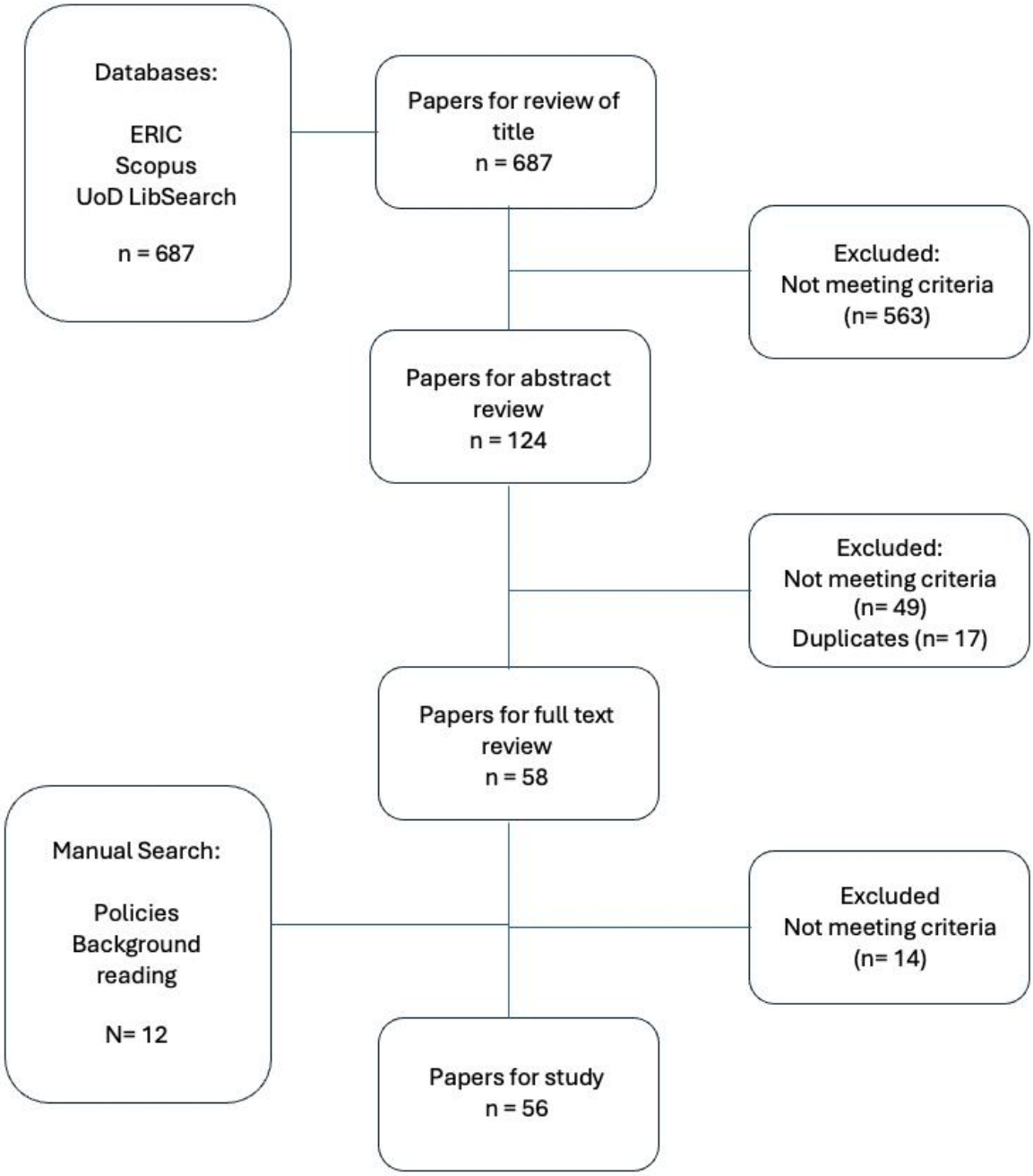
Synonym Grid

Relationship	**Screen time**	**Early years**	**Behaviour**
correlation association link connection impact influence effect	digital media use media exposure screen use device use technology use digital exposure screen viewing tablet use mobile use	early childhood preschool kindergarten nursery foundation stage toddlers infant baby 0–5 EYFS	behavior (american spelling) Classroom behaviour

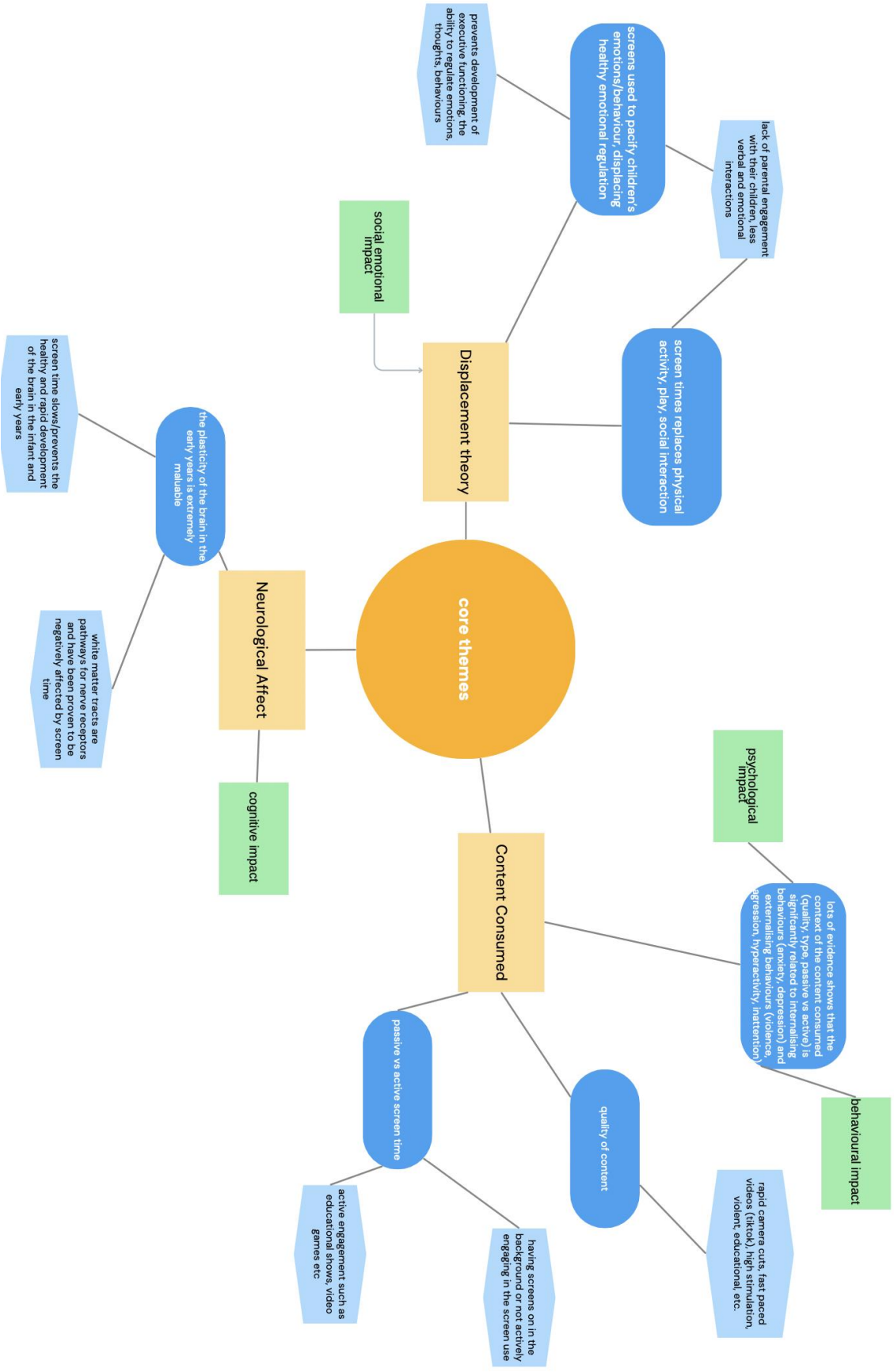
Appendix 3 – Search Strings with Results per Database

Code	Search string	UoD LLS	ERIC	Scopus	Google Scholar
KS1	effects of screen time on the scottish behaviour crisis	N/A	N/A	N/A	~40,600 results
KS2	screen time and behvaiour crisis scotland	N/A	N/A	N/A	~59,200 results
KS3	early years screen time effect on behvaiour	N/A	N/A	N/A	~ 2,420,000 results
KS4	(early years) AND (screen time) AND (Behaviour)	04/10/25 1172 results	04/10/25 5 results	N/A	04/10/25 ~2,700,000 results
KS5	(early years) AND (screen time) AND (Relationship) AND (Behaviour)	05/10/25 239 results	05/10/25 2 results	N/A	05/10/25 ~2,120,000 results
KS6	(relationship OR correlation OR association OR link OR connection OR impact OR influence) AND ("screen time" OR "digital media use" OR "media exposure" OR "screen use" OR "device use") AND ("early years" OR "early childhood" OR preschool OR nursery OR "foundation stage" OR toddlers OR infant OR "0-5" OR kindergarten) AND (behaviour OR behavior OR "behaviour problems" OR "behavioural issues" OR "disruptive behaviour" OR "classroom behaviour" OR "emotional regulation" OR "social behaviour")	07/10/25 1559 results (944 post application of criteria)	09/10/25 44 (26 post application of criteria)	09/10/25 1184 (664 post application of criteria)	N/A
KS7	(relationship OR correlation OR association) AND ("screen time" OR "digital media use" OR "screen use" OR "device use") AND ("early years" OR "early childhood" OR toddlers OR infant OR "0-5") AND (behaviour OR behavior OR "classroom behaviour")	08/10/25 605 (412 post application of criteria)	09/10/25 18 (14 post application of criteria)	09/10/25 424 (261 post application of criteria)	N/A

Appendix 4 – Inclusion Exclusion Flow Diagram



Appendix 5 – Theme Mapping Mind Maps



Appendix 6 – Core Themes & Subthemes Colour Code

Theme	colour	Subthemes	shade
Neurology behind early screen use		Cognitive impacts	
		Executive functioning (working memory, problem solving, intrinsic motivation)	
Displacement theory		Social/emotional impacts	
		Screens as pacifiers (lack of parental engagement)	
		Executive functioning (regulatory abilities)	
Content consumed		Passive vs active screen viewing	
		Externalising behaviours	
		Internalising behaviours (psychological)	
Parents as positive mediators			

Appendix 7 – Example Theme Coding on Notes

Reference	Notes	Key quotes

Al Moussawi, I., Bendak, L., Ziab, H. (2024) '"Virtual Autism" and Excessive Screen Exposure in Children Aged 0-3 Years: A Cross-sectional Study in the Lebanese Context' *International Journal of Pediatrics and Adolescent Medicine*. Vol 11(4), pp. 116-127. DOI: 10.4103/IJPAM.IJPAM_109_24	• Potential for children to develop actual addictions to screens as engagement with online games activates brain pathways that resemble substance addicts.
	• The neurotransmitter dopamine is elevated with prolonged internet use. The brain's "reward system" remembers the joy of the activity leading to the brain wanting to repeat it. this cycle disrupts dopamine production which begins psychological dependence on the screens.
	• As with any addiction, this interferes with wellbeing, causes potential withdrawal symptoms and extreme dysregulation in the nervous system.
	• Extensive screen time isolates children from the physical environment, preventing social interaction and the acquisition of communication skills. This also causes delays in language development, with the risk of language disorders increased with the duration of daily screen exposure.
	• The concept of "virtual autism" is that sensory-motor and social-emotional deprivation resulting from prolonged engagement with screens for more than 4h daily could affect behaviours and traits similar to those observed in children with autism.
	• The later screen exposure begins, the less likely they are to develop autism like traits. More than 81% of the children with ASD who participated in the study began screen usage before 2 years old. The first 3 years of life are most important to not expose to screens for 3 probable reasons:
	  • Content complexity: since young infants sensory and cognitive systems are still developing, they may not be able to process of engage with screen content efficiently
	  • Sensory overload the bright lights, fast motion, and loud sounds of screen material can be overwhelming for infants whose sensory systems are not "mature," especially since the period before the age of 2 years is characterized by rapid and dynamic brain development that has significant importance in the cognitive skills of children and is associated with the risk of disorders like autism. This sensory overload may cause overstimulation and have an adverse effect on their behaviour and sensory processing.
	  • The interaction with peers and caregivers: children below 3 develop their emotional and cognitive skills by relying heavily on interaction with their peers and caregivers but screens are sources of limited interaction and potentially hinder the development of these essential skills.
		"The study highlights the robust correlation between early and prolonged screen exposure and the emergence of ASD-like behaviours and other cognitive and sensory skills." p. 116
		
		"Furthermore, it implies that prolonged screen exposure may have consequences beyond speech development, social interaction, and hyperactivity, potentially affecting a variety of cognitive and sensory skills." p. 117
		
		"Interestingly, studies indicate that engagement in online games activates specific brain pathways, resembling the brains of substance-influenced drug addicts, potentially leading to addictive screen behaviors that interfere with home life and school functioning." p.118
		
		"For instance, studies reported that excessive display screen exposure correlates with reduced family interaction, weaken learning skills, and decreased engagement in creative play." p.118
		
		"prolonged screen exposure, which frequently includes bright lights, fast motion, and loud sounds, may overstimulate a child's sensory system that is not ready yet for that intensity of sensory inputs. Consequently, this overstimulation may contribute to sensory-related signs associated with autism. " p. 125
		
		"correlation does not necessarily imply causation, and further research is needed to exhibit the causal relationship and delve into the mechanisms through which screen exposure can impact a child's brain, leading to the development of such traits. Furthermore, factors like the content watched and parental involvement in screen time may play a role and should be investigated further in the future." p. 126

Appendix 8 – Research Poster

Is screen time in the early years (0-5) affecting the behviour crisis in Scottish primary schools?

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Introduction

Early childhood (0-5) is a period of rapid neurological, social, and emotional developemnt. Recent concerns with Scottish primary schools highlight a growing behvaiour crisis, prompting questions about the influences shaping children's self regulation, executive functioning, and social skills.

One emerging factor is increasing exposure to digital screens among young children.

This research aimed to explore how infant, toddler and preschool screen usage may be contributing to the behavioural challenges faced when they reach primary.

Methodology

This was a qualitative, literature based enquiry, adopting a narrative review to gather and synthesise existing research on early childhood screen use. Using the search strategy across academic databases and grey literature, 56 relevant sources were identified.

These texts were then examined using a thematic analysis approach following Braun & Clarke's (2006) steps. The data was coded inductively, allowing patterns and recurring concepts to be organised into meaningful themes. This method provided a flexible yet rigorous structure for interpreting the breadth of evidence included in the enquiry.

Key Findings

Displacement Theory:

- Screen time often displaces experiences essential for social-emotional development like play, social interaction and parent-child communication
- Social-emotional skills support self regulation, cooperation, and attention, meaning children who lack them are more likely to display impulsivity, behavioural challenges surrounding peer interaction, and inability to regulate their emotions and thus behaviour.

Eric (2021)

Content Consumed:

- The quality of screen content matters as much as quantity.
- Type of content predicts both internalising (anxiety, depression) and externalising behaviours (aggression, hyperactivity, impulsivity) in children.
- Fast-paced, highly stimulating digital content (e.g. TikTok style videos) is associated with reduced attention span, emotional dysregulation and addiction like symptoms in young children.

Fitzpatrick et al. (2023)

Neurological Affects:

- 0-5 is a highly malleable period for brain development. Excessive screen time interferes with the formation of white matter pathways that are crucial for cognition, attention, and executive functioning.
- This predicts the behavioural concerns reported in the classroom, such as higher levels of inattentiveness, emotional volatility and difficulty following instructions.

Hutton et al. (2024)

Conclusion

Early screen exposure contributes to attentional, regulatory and social vulnerabilities increasingly evident in Scottish classrooms. Its developmental effects, interacting with additional environmental factors, can reduce children's readiness for learning and heighten behavioural complexity. Although not a sole cause of Scotland's behaviour crisis, screen use appears to meaningfully shape early behavioural trajectories, aligning with teachers' reports and highlighting the need to strengthen early developmental experiences and clearer guidance around digital use.

References

- Braun, V. and Clarke, V. (2006) 'Using Thematic Analysis in Psychology.' *Qualitative Research in Psychology*, Vol 3(2), pp. 77-101. Available at: https://doi.org/10.1191/1478088706qp063oa
- Eric, O. (2021) 'The negative effects of new screens on the cognitive functions of young children require new recommendations', Italian journal of pediatrics, Vol 47(1). Available at: https://doi.org/10.1186/s13052-021-01174-6.
- Fitzpatrick, C. et al. (2023) 'Reducing harm and promoting positive media use strategies: new perspectives in understanding the impact of preschooler media use on health and development', *Psicologia, reflexão e crítica*, 36(1). Available at: https://doi.org/10.1186/s41155-023-00262-2.
- Hutton, J. S. et al. (2024) 'Digital Media and Developing Brains: Concerns and Opportunities' *Current Addiction Reports*. Vol 11, pp. 287-298. Available at: https://doi.org/10.1007/s40429-024-00545-3