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Smartphone and Social Media Interventions: Narrative Review and Recommendations

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Foreword

From the Prudence Trust

Across the UK and internationally, there is growing concern about the ways in which digital platforms can shape young people's wellbeing and everyday lives. These concerns are voiced by young people themselves, by parents, by professionals working with families and schools, and by researchers and policymakers. While most agree that technology products should be designed to be safe by default and held to account through regulation, we also recognise that creating a safe online environment will take time. In the meantime, the pace of technological change is fast, childhood is short, and the potential for harm is immediate.

The Prudence Trust has come to the conclusion that there is a responsibility to explore practical steps that can reduce harm, while wider structural solutions continue to develop. However, there is no single consensus on what precautionary action should look like. Proposed responses range from individual behaviour change tools, to family-based approaches, to school-level policies – many of which are unevenly evidenced. In this context, we commissioned this research not to advocate for a particular solution, but to strengthen the evidence base available to those who share a concern about this issue and who are making real-world decisions, including funders like us.

The question guiding this review was: *'Is it possible to help young people control their use of social media and screens and what are the most promising approaches?'.* To answer this, we asked Prof Amy Orben and colleagues at University of Cambridge to investigate the *mechanisms* that could support teenagers to manage their interaction with digital platforms. Secondly, we asked the research team to map existing evidence across different points of influence - including tools built into apps or browsers, approaches focused on individual skills, and interventions involving families and schools. Finally, we asked the team to assess which types of interventions appear most promising, taking into account not only effectiveness, but also acceptability, feasibility, and potential for reach.

Our aim was to move toward a clearer understanding of what options exist, what they can realistically achieve, and where the most significant gaps in knowledge remain. This work is intended to support policymakers, researchers, educators, youth work professionals, families and funders to engage with this issue in a more informed way – recognising both the urgency of young people's experiences today and the benefit of evidence-led action. We hope this review contributes helpfully to the conversation.

From the academic author team

This scoping review set out to appraise a fragmented body of research on interventions designed to address compulsive smartphone and social media use in adolescence. Rather than asking whether social media is "good" or "bad," the focus was on identifying what interventions exist across different points of delivery, how different interventions work, and what evidence exists regarding their effectiveness and scalability.

The review highlights promise and limitations. Some approaches — particularly those that encourage reflection on use, introduce small barriers to habitual scrolling, and build practical digital skills — demonstrate encouraging short-term outcomes. At the same time, the review

reveals important gaps, including limited long-term follow-up and uneven evaluation of widely used tools. Further, the review focuses on specific wellbeing and behavioural indicators and does not examine the other broader impacts that compulsive smartphone or social media use has on young people, which are the subject of current policy debate.

For policymakers and funders, this means that while the current evidence can support prioritisation and investment decisions, it should be interpreted with caution. Intervention effects appear to vary by context, implementation, and population, and cannot yet be safely assumed to generalise across settings. We hope this report contributes to one dimension of this ongoing and evolving discussion.

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Executive Summary

Background
Adolescents aged 10–24 years old increasingly report experiencing persistent, difficult-to-control social media and smartphone use, shaped by developmental vulnerabilities in self-regulation and by persuasive platform design. Governments, schools, families, and adolescents themselves are seeking effective, scalable solutions, yet the evidence base is fragmented and filled with contradictory conclusions on the nature of online harms. This narrative review synthesises 70 interventions designed to promote healthier digital engagement among adolescents, with a specific focus on compulsive use.

Methods
Interventions were mapped across six implementation levels (*app/browser, individual, family, and school*) and our novel Theory of Change highlighted six mechanisms of change (*friction, self-monitoring/awareness, self-regulation, access control, knowledge building, and mediation/modelling* – definitions can be found in Theory of Change section). We then applied the MRC Framework for Developing and Evaluating Complex Interventions to assess evaluation quality and classify each intervention's readiness for wider real-world implementation.

Results
The evidence landscape reveals a fundamental disconnect between rigorous intervention evaluation and widespread intervention adoption. Interventions with strong experimental support remain confined to small research trials, while commercially deployed tools reaching millions lack independent evaluation. Further, while interventions differ widely in format and delivery setting, many of the more promising examples combine mechanisms such as *self-regulation, self-monitoring,* and *friction;* suggesting that the underlying mechanisms of change may be more important than the intervention level itself, although current evidence is not yet sufficient to determine which combinations are most effective. At the same time, the field lacks evidence on durability of impact: follow-up data beyond six months is rare, and where it exists, effects often attenuate. As such the field can effectively demonstrate short-term shifts in behaviour, but cannot yet speak confidently about sustained self-regulation and positive mental health outcomes.

Findings by Implementation Level

- App- and browser-based tools harness *friction* and *self-monitoring* to interrupt habitual smartphone or social media use and foster reflection. The most widely adopted platforms remain unevaluated, despite their reach, however there are some exceptions where promising initial evaluations have been produced.
- Individual-level interventions grounded in cognitive-behavioural frameworks demonstrate short-term reductions in problematic smartphone or social media use and improvements in wellbeing, though their reliance on therapist-led delivery can limit scalability.
- Family-based approaches highlight the importance of relational mechanisms — parents and adolescents collaboratively setting digital boundaries within supportive relationships can reduce conflict around digital use, but existing evidence is geographically narrow and socioeconomically skewed.
- School-based interventions show potential for equitable reach, with teacher- and peer-led curricula improving digital literacy, emotion regulation, and wellbeing in several

contexts. There has been a large range of implementations and evaluations of certain school or national interventions such as smartphone bans. This makes it impossible for our review methodology to offer a comprehensive judgement of their effectivity, which would require a systematic search and integration of all relevant studies and reports.

Implications for Investment

To guide funders and policymakers, all interventions were categorised into five groups (A–E) based on evidence strength, stage of development and translational potential. For further details, please see Table ES1:

- Category A: low-burden, mechanism-driven tools ready for scaling.
- Category B: effective but labour-intensive programmes requiring adaptation.
- Category C: promising early-stage innovations needing powered trials.
- Category D: widely used but unevaluated tools and policies.
- Category E: mixed or context-dependent evidence requiring more comprehensive systematic review.

Cross-cutting Considerations

- Resource requirements differ sharply by intervention type: app/browser tools are highly scalable once developed; school interventions rely on curriculum time and teacher capacity; individual and family programmes typically require sustained facilitator involvement.
- Youth co-design is rare but valuable: although only five interventions involve adolescents in early design, co-design appears to improve relevance, acceptability, and engagement and should be embedded more systematically.
- Harm–benefit balance (i.e., capacity to reduce harms while preserving beneficial uses) vary by mechanism: autonomy-supportive, skill-building approaches generally show positive or neutral outcomes, while access-control strategies (e.g., bans, abstinence) produce more variable effects shaped by enforcement, context, and individual differences.

Limitations

Searches were restricted to Google Scholar and the first 100 results per level, introducing recency, language, and publication bias. This analysis is not a meta-analysis; effect sizes and heterogeneity were not estimated. Quality appraisal was brief and design-based, and most studies were conducted outside the UK, raising uncertainty around applicability to UK settings.

Conclusion

In short, this field is rich in innovation but lacks the cumulative, scalable evidence required for confident implementation. Progress now depends on evaluating high-reach tools, strengthening promising programmes for realistic delivery, and expanding research to populations currently missing from the evidence base. The decision-support framework presented here offers funders a practical, mechanism-focused roadmap for investing in approaches that can deliver meaningful, sustained improvements in adolescent digital wellbeing and positive mental health outcomes.

Table ES1: Overview of Intervention Types, Mechanism of Change, and Strategic Implications for Philanthropic Funding

Category	Intervention Examples	Mechanisms of Change	Funder Action/Risk/Opportunity
A: Proven and Scalable **(9 interventions)**	• Friction-based apps that add a pause or reflective prompt before opening social media • "Digital habit" workshops teaching micro-skills • Light-touch parent guidance (discussion, negotiation, temporary restriction) • Teacher/peer-led school sessions on attention, self-control, impulse management	• Self-Regulation: intentional pausing, choice, impulse control • Self-Monitoring: usage tracking, awareness of patterns • Friction: brief interruptions before use behaviour • Knowledge Building: understanding of digital habits and triggers of compulsive use	**Action:** Scale in UK settings with in-depth evaluation **Risk:** Limited evidence of long-term efficacy (<3 months) **Opportunity:** Low-cost, high-reach interventions with strong acceptability offer a practical route to rapid population-level impact if supported with iterative evaluation, and proven effective of scale.
B: Proven but Limited Reach **(17 interventions)**	• Structured CBT-based programmes teaching impulse control training, cognitive restructuring, and coping skills. • Family programmes teaching communication, supervision, and digital boundaries • Facilitator-led skills curricula requiring trained teachers or clinicians to	• Self-Regulation: structured practice of CBT components • Mediation/Modelling: adults modelling healthy digital behaviour • Knowledge Building: weekly skills lessons + reflection	**Action:** Explore options to adapt or streamline delivery (e.g., digital, hybrid, or self-guided elements) to improve reach while preserving core mechanisms **Risk:** Without adaptation, high delivery costs and staffing requirements will continue to constrain scalability **Opportunity:** Strong theoretical coherence (e.g., SDT) offers a solid platform for scaling.

	deliver guided self-regulation, motivational, or behavioural exercises.		
C: Promising but Early-Stage **(14 interventions)**	• Prototype pause-and-reflect or mindfulness-nudge apps disrupting automatic checking. • Early cognitive-behavioural programmes using restructuring, reflection, contingency management, or alternative activities. • Early family and parent-focused programmes using CBT and communication training to shape digital use. • Small school pilots introducing basic digital self-regulation routines.	• Self-Regulation: simple prompts encouraging intentional use • Self-Monitoring: basic usage logs or weekly charts	**Action:** Validate through well-powered trials (N≥100, ≥6-month follow-up, independent teams). **Risk:** High uncertainty given limited existing evidence; unclear whether these interventions will offer incremental utility over and above those in categories A or B. **Opportunity:** Potential to shape development early using robust and theory-consistent methods (e.g., co-design, equity principles, etc.)
D: Widely Adopted but Unevaluated **(18 interventions)**	• Platform and app-based control tools for limits, blocking, monitoring, and friction. • Standalone digital-wellbeing apps and extensions offering timers, tracking, and distraction reduction.	• Self-Monitoring: time/usage visibility • Friction: brief interruptions before use behaviour • Access Control: blocking or limiting access	**Action:** Fund independent studies to test the real-world impact of these widely used tools. **Risk:** Commercial incentives may resist transparency or rigorous testing, no guarantee companies will engage in evidence creation/change.

	• Family management tools supporting supervision and shared digital rules. • School digital citizenship curricula promoting healthy online behaviours.		**Opportunity:** Biggest evidence gap; high-value area for strategic commissioning
E: Needs Systematic Evaluation due to Mixed Evidence **(12 interventions)**	• School smartphone bans • Short term social media abstinence • Family-based restrictive rule-setting approach	• Access Control: removal, blocking, restriction	**Action:** Fund more systematic reviews to synthesise existing international evidence, clarify sources of heterogeneity, and determine when access-control approaches help, have no effect, or risk harm. **Risk:** Adopting access-control approaches without clearer evidence may lead to uneven implementation, unintended consequences, or variable experiences (e.g., across different school settings). **Opportunity**: Helps identify the contexts, age groups, and implementation styles in which access-control approaches may be most helpful, supporting more informed and tailored school decisions.

Introduction

Concerns about the effect of social media on adolescent wellbeing have risen alongside the decline in youth mental health in recent years.[1] Documented harms linked to adolescent social media use are diverse; they encompass suicides associated with online content exposure,[2] compulsive or addictive usage patterns that disrupt sleep and learning,[3] exposure to sexual solicitation and exploitation risks,[4] and cyberbullying experiences that contribute to anxiety, isolation, and self-harm.[5]

In response to these concerns, a range of *social media interventions* — broadly defined as behavioural interventions designed to change patterns of social media use[6] — have been developed to promote healthier social media use and support mental health. However, recent reviews reveal a fragmented and methodologically limited evidence base. Plackett et al. (2023) reviewed 23 studies testing social media interventions such as abstinence, screen time limits and therapy-based interventions (e.g., cognitive behavioural therapy, mindfulness-based therapies). While therapy-based interventions showed the most promise for reducing adverse mental health outcomes like depression, most studies were small, short-term, and methodologically weak.[7] Extending the lens beyond solely social media use, Tock et al. (2025) evaluated 81 interventions promoting healthy screen use among adolescents. They found that while many short-term, school-based programs reported modest gains in literacy or reduced screen time, long-term impact was rarely assessed. [8] Both reviews depict a field dominated by early-stage, heterogeneous pilot work rather than robust, scalable interventions. There is, therefore, little consensus on *what* works and *for whom* with regards to social media interventions; the evidence-base is similarly limited for how such approaches could be effectively embedded to reduce problematic and compulsive social media use.

One of the key outcomes assumed to be targeted by existing interventions is *inhibitory control*, defined as the ability to suppress automatic impulses to act with internal goals.[9] Neurodevelopmental research shows that brain regions supporting self-regulation, particularly within the prefrontal cortex, continue to mature throughout adolescence.[10,11] As a result, adolescents may find it more difficult to disengage from rewarding digital cues, despite intending to stop. Empirical studies demonstrate this mismatch between intention and behaviour; many young people report checking their phones automatically or continuing to scroll despite knowing it conflicts with other goals, such as sleep or homework.[12] However, framing compulsive use solely as a deficit in inhibition risks oversimplification. Many young people with relatively strong self-control still struggle, partly because platforms are deliberately engineered to capture attention through variable reward schedules and personalised algorithmic content. This presents a significant challenge for young people with developing inhibition abilities; this is also partly because of normal developmental processes that make adolescents uniquely motivated to use social media (e.g., easy access to peers, opportunities for bonding and group cohesion).[13] Effective interventions must therefore go beyond strengthening inhibition skills, to address adolescents' motivation for social media use, what factors trigger compulsive use, and what alternative activities can meet their underlying needs.

Challenges of Interpreting the Evidence Base

Developing effective interventions is, however, far from straightforward. Social media interventions present unique challenges that distinguish them from other public health interventions targeting adolescent behaviour (e.g., smoking prevention, physical activity

promotion). Understanding these complexities is essential for interpreting the evidence-base and setting realistic expectations about what interventions can achieve. These challenges include:

1. Defining compulsive/problematic social media and smartphone use.
2. The rapidly evolving nature of digital technologies.
3. Retaining the benefits of social media use.
4. Navigating competing priorities across stakeholders.

First, reducing "compulsive use" remains at times an elusive target for interventions. What constitutes problematic or compulsive social media use is conceptually unclear and highly context-dependent, with no clear consensus among researchers.[14] Time-based definitions overlook that the quality and purpose of engagement often matter more than duration,[15] while addiction frameworks borrowed from substance use do not translate well to digital contexts. [16] Moreover, social norms evolve: "heavy use" in 2010 now represents typical engagement.[17] Platform affordances also differ, but interventions often treat "social media" as a single, uniform entity. As Plackett et al. (2023) observed, many interventions lack clear theoretical grounding in which mechanisms they target or why.[7] This complicates both evaluation and replication.

Second, rapidly evolving technological ecosystems create a moving target for researchers. Social media platforms change continuously: algorithms update, features appear and disappear, new platforms emerge. By the time an intervention is rigorously evaluated, the technological landscape is likely to have shifted. The fast-paced nature of the social media environment demands that we distinguish between platform-specific interventions, which require continual adaptation, and mechanism-focused approaches that target underlying processes such as self-regulation. The latter are more likely to remain relevant across rapidly evolving platforms.

Furthermore, the question of balancing harms and benefits is more complex than in other public health domains. Unlike unambiguously harmful behaviours (e.g., smoking), aspects of social media can provide genuine benefits such as social connection, identity exploration, information access, creative expression, and community, especially for marginalised adolescents.[18,19] Interventions reducing use without considering what replaces social media can risk triggering unintended consequences. After all, an adolescent who reduces Instagram by two hours, but fills that time with passive television consumption or isolation, may not have necessarily improved their wellbeing. This replacement problem demands that we understand not only which behaviours to reduce, but also which healthy alternatives should be encouraged in their place.

Finally, interventions must navigate competing priorities across stakeholders. Adolescents value autonomy and social connection;[20] parents tend to prioritise safety and long term benefits; schools face time and capacity constraints; clinicians emphasise evidence-based practice but have limited capacity; policymakers respond to sociopolitical pressures. These interests might not align. An intervention preferred by clinicians may be unaffordable for schools, while an app promoting adolescent self-regulation may conflict with parental demands for monitoring. Policies such as smartphone bans may reassure parents but restrict young people. Strategic coherence requires identifying interventions satisfying multiple stakeholders and weighing up their relative needs as well as potential harms.

Implications of the Complexities

These challenges carry several important and interconnected implications for interpreting the evidence-base and setting realistic investment priorities:

1. **Evidence quality** is inherently limited: even well-designed trials face technological obsolescence/outpacing, platform interference, and difficulty defining meaningful outcomes. Technology companies routinely inhibit independent research, imposing restrictive data-sharing agreements.
2. Null findings may reflect **implementation failure** rather than conceptual flaws. An intervention might work in principle but fail in practice due to platform design actively working against it, inability to overcome sophisticated engagement engineering (e.g. infinite scroll), or misalignment with actual rather than assumed use patterns and motivations.
3. **Context-specificity** is high: interventions effective in one technological, cultural, or developmental context may not transfer to others, with external validity particularly limited given the rapid evolution of digital platforms.
4. **Long-term outcomes** are rarely considered and difficult to interpret; as the platform ecosystems may have shifted substantially by the time follow-up data are collected. This can, at times, make it unclear whether sustained effects reflect intervention durability.
5. **Scalability** remains an issue: even interventions that succeed in controlled settings may not translate if they demand resources, skills, or contextual adaptations unavailable in large-scale real-world implementation.

This review interprets evidence with these limitations in mind, balancing optimism about intervention potential with pragmatism about what can be achieved in adversarial, rapidly changing technological contexts. This culminates in strategic recommendations aimed at identifying where investment might lead to improved consolidation and translation of promising approaches.

Theory of Change

Prior to this report, we developed a Theory of Change (ToC) report (see Appendix 1), This document sets out the conceptual foundations for our work, including a glossary of key terms (see Appendix 1.1), the methodological principles guiding our approach, and the rationale for structuring interventions across multiple levels.

Our Theory of Change is a framework linking intervention levels to outcomes through explicit mechanisms of change. It aligns closely with emerging complex-systems approaches to public health evidence.[21] Further, it moves beyond viewing interventions as isolated actions that produce linear, predictable effects and recognises that compulsive social media use is embedded within interconnected systems operating across multiple levels. In our ToC, these span from platform design features and individual psychological processes to family routines, school environments, and broader societal norms. Within such systems, change is rarely straightforward: interventions interact with existing mechanisms, trigger feedback loops, and can produce both intended and unintended consequences as the system adapts. Our ToC framework is presented in Appendix 1.2 (detailed version) and Appendix 1.3 (high-level version) and comprises three primary elements:

(1) Implementation Levels: We mapped interventions across six contexts in which social media interventions operate: *platform, app/browser, individual, family, school,* and *society,* adapted from Skeggs and Orben (2025).[6] These represent different points where actions can disrupt compulsive use.

(2) Mechanisms of Change: Interventions are categorised by the psychological, behavioural, or social processes through which they achieve effects. Our six identified mechanisms include *friction, self-monitoring, access control, self-regulation, knowledge-building,* and *mediation/modelling* (see Table 1). Each identified mechanism is described in terms of its connection to Self-Determination Theory (SDT), and SDT's three core psychological needs: autonomy, competence, and relatedness (see Self-Determination Theory and Other Psychological Theories section for fuller discussion). For each mechanism, we specify: moderating factors (e.g., age, habitual strength, ease of workarounds), key assumptions about how and why change occurs, and potential for unintended consequences.

(3) Outcomes: We grouped outcomes by how quickly they typically appear: short-term outcomes (e.g., increased awareness of usage patterns, reduced impulsive app openings), intermediate outcomes (e.g., reduced overall screen time, development of alternative activities), and long-term outcomes (e.g., improved wellbeing and mental health, stronger offline relationships, reduced anxiety and depressive symptoms, greater life satisfaction).

Based on our preliminary feasibility analysis, we found that *platform*- and *society*-level interventions have lower investment relevance than the other intervention levels, due to limited tractability as they require industry or government control, and largely low theoretical plausibility and weak evidence base. We therefore focus this report on the four levels most suitable for research investment: *app/browser, individual, family,* and *school.*

Table 1: Mechanism of Change Overview

Mechanism of Change	Definition	General Example
Friction	Automatic/impulsive behaviour is interrupted by small delays or additional steps.	Apps requiring some action or intention confirmation before opening social media.
Self-Monitoring	Redirection of attention toward intentional use with feedback and reflective tools.	Screen time dashboards showing daily/weekly statistics.
Access Control	External restrictions reducing access to online spaces, e.g., limiting *when* or *how long* use occurs.	School smartphone bans; platform-specific time limits.
Self-Regulation	Internal capacity for self-reflection, emotion regulation, and intentional behaviour management.	Training programs building self-efficacy skills (e.g., distress tolerance, emotion regulation) to support intentional use of technology.

Knowledge Building	Education about technology impacts, digital literacy, online safety, persuasive design, and healthy use strategies.	School curricula on privacy, cyberbullying, algorithmic manipulation.
Mediation/Modelling	Mediation works through dialogue and shared problem-solving, modelling reinforces desired behaviours to change social norms and expectations around technology.	Parents collaboratively setting device-free times; parents demonstrating healthy phone habits.

Self-Determination Theory and Other Psychological Theories

Our review is grounded in Self-Determination Theory (SDT),[22] which posits that human motivation and wellbeing depend on satisfaction of three fundamental psychological needs: autonomy (experiencing choice and volition in one's actions), competence (feeling effective and capable), and relatedness (feeling connected to others). Critically, SDT suggests that interventions based solely on restricting use (e.g., by imposing tight external controls, limiting choices, or emphasising compliance) might inadvertently stifle these needs, leading to resistance, disengagement, or even oppositional behaviour.[23] In such situations, autonomous motivation ("I'm choosing this because it matters to me") is undermined and replaced by external pressures ("I'm doing this because I have to"). This shift may produce short-term compliance, but without need satisfaction, the behaviour is unlikely to be maintained or internalised over time. [24]

While our work is grounded in SDT, there are other psychological theories relevant to this work and consistent with our proposed mechanisms of change. For example, social learning theory [26] proposes that people learn behaviours by observing others (e.g., *modelling*), and then imitating or avoiding those behaviours (e.g., *self-monitoring*). Habit disruption and discontinuity theories suggest that habits are learned stimulus-response associations that are cued by stable contexts and executed with little conscious deliberation.[25] Therefore, successful interventions are those that weaken or break social media habits by disrupting the otherwise stable contexts in which they were formed (e.g., via *friction, self-monitoring, access control*). Finally, dual process theories[26] suggest that behaviour represents the interaction of two competing systems, one reflective (e.g., slow, deliberative thinking and action) and one impulsive (e.g., fast, associative thinking and action). In many ways, social media capitalises on the impulsive system, by harnessing notification sounds and badges, and offering immediate rewards (e.g., "likes", novelty, social contact). Therefore, interventions that encourage or support the reflective system while weakening the automaticity of the impulsive system will be the most effective. For example, interventions that encourage periodic reflection on one's usage goals (e.g., *self-monitoring*), and those that increase delays and effort required to access content (e.g., *friction*).

We have chosen to ground our work in SDT because, unlike habit or dual-process perspectives that focus primarily on cues and automaticity, and unlike social learning theory which emphasises modelling and norms, SDT directly addresses the quality of motivation driving behaviour change. Whereas habit-focused or impulse-control approaches can reduce use in the short term by adding friction or disrupting cues, SDT explains *when and why* individuals will

internalise new digital habits, engage by choice rather than compulsion, and maintain changes beyond the intervention period. In this sense, SDT shifts the focus from solely limiting behaviour to fostering intrinsically meaningful, self-endorsed engagement with technology, making it particularly well suited for evaluating interventions.

Aims

The review addresses two primary objectives:

Objective 1: To map the extent, nature and quality of intervention research targeting adolescent compulsive social media use across four implementation levels (*app/browser, individual, family, school*).

Objective 2: To evaluate which interventions are most feasible and promising to receive philanthropic support.

Methodology

Whilst pre-specified, our search was not systematic due to time constraints. Further, we synthesised our findings narratively. This review is therefore broader, less-in depth and has a higher risk of bias than a formal systematic review.

We first searched Google Scholar by screening the first 100 results by title, before proceeding to abstract and full-text screening. The search terms are: ('[intervention level]' AND ('social media' OR 'smartphone') AND 'intervention' AND 'compulsive') AND (('[intervention level]' AND 'social media' OR 'smartphone') AND 'intervention' AND 'problematic'). Data were extracted in Microsoft Excel by VY and IF. The data extraction template can be found in Appendix 3.

To complement this, we also hand-searched relevant reviews and reference lists. This included capturing interventions that may not have been published in peer-reviewed journals but represent real-world implementation efforts. These included policy documents and descriptions of publicly available apps.

Finally, we consulted three international experts (Prof Katie Davis, Dr David Grüning and Prof Victoria Goodyear) in adolescent digital interventions to identify additional studies, ongoing trials, and unpublished evaluations. Studies were included if they met the following criteria:

1. Published in the English language
2. Studying compulsive social media or smartphone use only*

*As a consequence of the lack of social media-specific research in family and school interventions, we chose to also include those interventions focused on general internet and screen-time for these levels. Such interventions can be broadened or made more specific with regards to what they offer and therefore constitute useful examples of family- and school-based interventions for social media use.

We first provide a descriptive review of what intervention exists, documenting the dominant mechanisms of change, level of evidence, and key characteristics of interventions at each level. Second, we provide an in-depth evaluation of what is most feasible to fund and implement with research support. This includes stage of development, translational potential, and evidence

strength, alongside cross-cutting factors such as co-design potential, cost, and harm-benefit balance. Interventions were mapped onto five categories under the Medical Research Council (MRC) Framework for Developing and Evaluating Complex Interventions framework.[27]

Results: Interventions by Implementation Levels

From our search strategy, we identified 70 interventions that met our inclusion criteria. We provide explanations of the dominant mechanisms of change targeted in each context, before evaluating the level of evidence available.

App/Browser Level

App/browser level interventions involve extensions or applications that modify users' interactions with social media. Common features include setting platform-specific time limits, rewarding users when they successfully refrain from use of social media apps, implementing behavioural 'nudges' to encourage intentional use, or forcing users to pause and reflect before launching the social media platform of choice.

As such, app/browser level interventions primarily target three mechanisms of change. By setting time-limits on certain features and/or apps, interventions target *access control* by limiting the amount of time that can be spent on each app. Other apps target *friction* by making it harder – but not impossible – for a given app to be used (e.g., forcing users to take a pause, or break, before launching an app). Finally, by requiring users to make active, intentional choices regarding their social media use, some app/browser interventions target the *self-monitoring* mechanism, where users are encouraged to be more aware of their existing goals and more purposeful with how and when they access social media.

The most compelling body of evidence exists for friction-based interventions, particularly those introducing brief, reflective interruptions before social media use. The 'One Sec' app was tested in a large Randomised Controlled Trial (RCT; n = 719), in which voluntary iOS users received a short delay and prompt (i.e., asking users to confirm that they want to open the app) before opening selected apps.[28] The intervention led to 36% of attempted sessions being cancelled and a 37% overall reduction in app launches.[29] Follow-up studies showed that the reflective prompt — asking users to confirm intention — was more influential than the time delay itself. Building on this, Haliburton et al. (2024) analysed real-world data from existing 'One Sec' users (n=1039) for thirteen weeks and found that app-open attempts declined exponentially during the first three weeks of use before plateauing.[30] Although total openings fell, the proportion of intentional openings increased (i.e., described by participants as a desire to decrease passive or habitual checking behaviour and increase intentional use), indicating more deliberate engagement rather than abstinence. However, periodic "breaks" in app use were common, with short-term rebounds when the friction was removed, suggesting the effects were contingent on continued use.[30]

These findings were independently replicated and extended by the Danish Competition and Consumers Authority's field experiment (n = 269; aged 13-17), which compared *Reflection* (prompting users to articulate their reason for opening an app and their current emotional state every fifth login), *Planning* (users plan their future consumption by setting time limits and receive notifications when limit is reached), and *Waiting* (delay/friction before access), all of which were designed to disrupt habitual social media use.[31] *Planning* and *Waiting* significantly reduced daily social media activity by 31–36% — and by up to 50% during school hours —

without decreasing satisfaction with social media or social connectedness. The *Waiting* condition, functionally equivalent to 'One Sec' and developed with the app team, produced the strongest effects. Importantly, the two effective interventions (*Planning* and *Waiting*) operated through distinct mechanisms: *Planning* reduced use primarily by decreasing frequency of app openings, while *Waiting* reduced both frequency and average session duration. This suggests that these interventions target two different self-control problems — whether a user opens apps too often or stays on them too long once opened. Furthermore, intervention effects were strongest among heavy users, those with lower self-control, and those reporting higher problematic use. This suggests that friction-based approaches are most beneficial for those who struggle most to disengage.

Complementing these friction-based findings, several other evaluated interventions emphasise self-monitoring and goal-directed regulation. Research on the 'WellSpent' app (n = 70) focused on personalised self-nudging and just-in-time prompts that encouraged users to set app-specific goals and alternative activities.[32] While average group differences were small, the intervention effectively reduced stress for individuals with higher baseline problematic use. Evidence from the 'Locus' app (n = 54), which replaces social media icons with a wrapper app and delivers daily goal-setting prompts, yielded large effects on perceived self-control, autonomy and intentional use.[33] Finally, a large study called 'Meine Zeit Ohne' (n = 4591) showed that app-based abstinence embedded in a wider health program significantly reduced social media use among adolescents.[34] However, all these have not been independently replicated.

The integration of artificial intelligence and adaptive persuasion marks an emerging intervention direction but lacks concrete evidence. 'MindShift' uses a large language model (LLM) to analyse real-time app use and emotional context, generating personalised persuasive messages and reminders.[35] A small field experiment (n = 25) suggests that 'MindShift' produced a 7–10% reduction in smartphone use and improved self-efficacy. 'StayFocused' intends to help users resist compulsive phone use through focus sessions wherein people voluntarily refrain from checking their phone. The creators of 'StayFocused' tested three versions of the app among college students with self-identified problematic smartphone use (n = 36): a baseline version allowing users to set distraction-free periods (25–125 min), a reflection version prompting users to explain early exits from the focus session or completions, and a reflection-chatbot version using a GPT-3 chatbot to deliver these prompts and respond conversationally. [36] Across five weeks, all groups reduced phone use, but only the reflection-chatbot group maintained lower use post-intervention and focused for longer daily periods. Participants reported that the chatbot's conversational feedback increased accountability and self-control. Though the research on both 'MindShift' and 'StayFocused' is at early feasibility stage, it suggests that LLMs can potentially meaningfully enhance reflection and engagement.

Despite these encouraging results, the majority of publicly available apps to control social media use lack any independent, peer-reviewed evaluation. These include popular app-based tools such as 'Forest',[37] 'Freedom',[38] 'Opal',[39] 'StayFree',[40] and 'ScreenZen',[41] (see Category D for full list) as well as built-in operating system features like Apple Screen Time[42] and Android Digital Wellbeing.[43] While these products reach millions of users, they remain externally unevaluated and often rely solely on self-reported testimonials or proprietary analytics. Their translational potential is therefore high, given the low delivery costs of app-based interventions, but their evidence maturity remains at a conceptual or feasibility stage.

Individual Level

Individual-level interventions involve structured programs or therapeutic approaches delivered to individuals or small groups, typically targeting those who have identified their social media use as problematic or who have been identified through screening. These interventions range from brief single-session mindfulness exercises that could be delivered via app to intensive multi-week therapeutic programs requiring trained clinicians. The rationale for intervening at this implementation level rests on several premises: individuals experiencing functional impairment from compulsive use may require more intensive support than universal school programs or self-guided apps provide; therapeutic relationships and skilled facilitation can address underlying psychological factors (loneliness, anxiety, perfectionism, emotion regulation difficulties) maintaining problematic use; and structured programs with accountability and group support may succeed where individuals struggle with self-regulation alone.

These interventions primarily target *self-regulation* and *self-monitoring* mechanisms, helping individuals develop awareness of their usage patterns, motivations, and emotional states while building skills for managing urges and making intentional choices about technology engagement. Many also incorporate *access control* through temporary abstinence periods or daily use limits, though typically framed as supporting self-regulation development rather than permanent restriction. Conceptually, they align with SDT's emphasis on autonomy and competence, supporting adolescents to feel capable and self-directed in managing their digital habits.

The evidence landscape at this level is heterogeneous. We identified 20 individual-level interventions spanning cognitive-behavioural therapy (CBT) and other therapeutic approaches (k = 4), mindfulness interventions (k = 2), abstinence and use-reduction experiments (k = 11), participatory workshops (k = 1) and alternative activities/displacement activities (k = 2). In practice, however, many interventions combine elements across these categories rather than fitting neatly within a single type. For instance, several CBT protocols incorporate mindfulness or emotion-regulation training; mindfulness interventions often include CBT components (e.g., cognitive reframing); and some abstinence or behavioural programs embed reflective or contingency-based strategies. This blending reflects a broader trend toward multi-component designs that address both the psychological drivers (e.g. craving, anxiety, avoidance) and behavioural patterns (e.g. time online, cue reactivity) of compulsive social media use.

Therapeutic interventions that directly target the psychological factors maintaining compulsive social media use show consistent short-term effectiveness, particularly among university aged populations in East Asia. For example, a trial comparing cognitive-behavioural therapy (including skills training, cognitive restructuring, and emotion regulation exercises) with mind-body exercise (practicing Qigong with a certified coach) and a no treatment control group across 12 weeks (n = 95) demonstrated that both mind-body exercise and CBT significantly decreased anxiety, while mind-body exercise only significantly decreased reported problematic social media use and loneliness.[44] Similarly, a mindfulness-based cognitive therapy (MBCT) combined with metaphor exercises intervention (n = 60) produced significant improvements in problematic social media use and emotional wellbeing compared to a no treatment control group.[45] A five-session Satir Transformational Systemic Therapy group counselling intervention (n = 60) also demonstrated significant reductions in depressive symptoms and problematic use compared to a no treatment control group.[19] Complementary lifestyle-based interventions, such as exposure to natural environments,[20] brief mindfulness exercises,[21] or

structured physical activity like basketball or Baduanjin (Chinese Qigong exercise),[22] demonstrated smaller but significant reductions in problematic use and improvements in well-being. Across studies, the extent to which one could engage with social media intentionally and regulate emotions consistently predicted intervention outcomes, highlighting the importance of the *self-regulation* mechanism in driving behaviour change.

The 'Reduce Digital Distraction Workshop' (ReDD) is a participatory workshop with university students designed around the assumption that individuals may need to combine multiple digital strategies across platforms to achieve sustained change in digital habits.[46] The programme included three components: a reflection phase, where participants articulated realistic goals for modifying their device use; an exploration phase, where they learned how different tools could address personal challenges; and a hands-on implementation phase, supported by an online catalogue that allowed participants to browse, filter, and apply preferred tools (e.g., extensions, apps, system settings) across operating systems. Participants (n = 280) reported significant improvements in perceived digital self-control and clarity of goals. This work demonstrates that combining reflective goal-setting with guided exploration of digital self-regulation tools may be as, or more, effective than implementing single-feature interventions in isolation. The workshop model also highlights strong potential for co-creation and user empowerment.

Given the prominence of abstinence and use-reduction strategies within individual-level interventions, we first summarise relevant findings from existing systematic reviews and meta-analyses. Plackett et al.'s (2023) systematic review of 23 experimental and quasi-experimental studies found that 39% reported some improvement in wellbeing, while 30% reported mixed effects and 30% reported no effects; notably, interventions with therapy-based components (e.g., CBT) were more effective than full social media abstinence or reduction. This is further supported by Lemahieu et al. (2025), whose meta-analysis of ten studies found no significant associations between social media abstinence and positive affect, negative affect, or life satisfaction.[47] Similarly, Radtke et al. (2022) reports predominantly null or mixed effects on wellbeing and social outcomes, despite consistent short-term reductions in smartphone or social media use during intervention periods.[48] Two meta-analyses, however, report small, outcome-specific effects, including reductions in depressive symptoms (Ramadhan et al., 2024)[49] and small average improvements in subjective and psychological wellbeing (Ansari et al., 2024).[50] A secondary reanalysis of a meta-analysis further suggested that intervention duration may moderate outcomes, with shorter abstinence periods (<1 week) associated with worse mental health outcomes and longer interventions (1 week or longer) associated with significant improvements (Thrul et al., 2025).[51]

The mixed synthesis-level evidence provides important context for interpreting the individual abstinence studies included in this review. In a four-week diary study of general users (n = 130), Hall (2019) found no changes in wellbeing, loneliness, or daily mood quality across abstinence durations of up to one month.[52] Similarly, three preregistered field experiments by Przybylski et al. (2021; n ≈ 600) found that one-day abstinence periods did not have measurable positive effect on wellbeing, but reduced perceived social relatedness and day satisfaction compared to normal-use days.[53] Other studies report small, subgroup-specific gains: Fioravanti et al. (2020; n = 80) observed increases in life satisfaction and positive affect only among women following a one-week Instagram break,[54] while Hanley et al. (2019; n = 78) found reduced positive affect among active users but no benefits for passive ones after a week off Facebook and Instagram.[55]

Collectively, these findings indicate that social media abstinence produces heterogeneous and often short-lived effects, with outcomes strongly moderated by user type, intervention duration and engagement patterns. Notably, the available evidence is drawn largely from adult or university-aged samples, with little evidence on healthy children and adolescents under 18, whose developmental stage, social contexts, and patterns of social media use may result in different responses to abstinence or use-reduction interventions. Despite mixed findings, abstinence may still hold conceptual value as a behavioural "reset" that temporarily disrupts automatic use patterns and helps shift users toward more intentional engagement, subsequently enabling scalable interventions to take hold more effectively

The individual-level evidence base is constrained by several methodological limitations. Studies typically employed small samples, with thirteen studies enrolling fewer than 100 participants and four with fewer than 50, producing unstable effect size estimates and limited power to detect moderators. Further, follow-up periods are typically brief (4 weeks to 3 months), precluding conclusions about durable behaviour change. The evidence base is also dominated by studies conducted outside the UK, particularly in university samples from Europe, North America, and East Asia, with ReDD and some smartphone abstinence studies being the exception. This limits generalisability to the UK context. Evaluations are also rarely independent, most are conducted by the teams that developed the interventions, raising the risk of bias. Mechanisms of change remain largely assumed rather than tested, with few studies conducting mediation analyses to identify whether effects derive from cognitive restructuring, mindfulness, behavioural activation, or social/group processes.

Taken together, the evidence suggests that interventions combining psychological skill-building with realistic, moderate behaviour change produce the most consistent benefits. Therapeutic approaches address the root drivers of compulsive use, while guided reduction strategies achieve sustainable improvement without the social loss often associated with abstinence.

Family Level

Family-level interventions recognise that adolescent social media use does not occur in isolation but within family systems that shape technology access, model digital behaviour, and provide — or fail to provide — effective guidance, boundaries, and emotional support. The rationale for this implementation level rests on several premises: parents maintain legitimate authority over household technology practices, particularly for younger adolescents;[56] parent-child relationship quality fundamentally influences adolescent receptiveness to guidance;[57] parental modelling of technology use shapes adolescent norms and behaviours;[58] and families can provide scaffolding for adolescent self-regulation development in ways that neither apps nor schools can fully replicate. For younger adolescents in particular — whose self-regulation capacities are still developing — parental co-regulation provides external support that can gradually be internalised, making it both developmentally appropriate and foundational for long-term self-control.[59]

The primary mechanism targeted by interventions at the family level is *mediation/modelling.* Mediation works through dialogue and shared problem-solving, while modelling reinforces desired behaviours by demonstrating balanced use, empathy, and emotional regulation. This creates a relational environment where boundaries are more visible, respected and sustainable.

The other mechanism at play is *access control* through parental rule-setting, curfews, device-free zones (bedrooms, mealtimes), time limits and content restrictions. Ideally, effective *mediation/modelling* and *access control* combined can support adolescents to internalise healthy digital norms and develop inhibitory control and media literacy. From the SDT standpoint, these approaches together strengthen relatedness (warmth, trust), competence (confidence in navigating digital environments), while minimising impact on autonomy (e.g., by encouraging self-directed regulation). When family communication is positive, boundaries become collaborative rather than coercive, creating conditions for durable behavioural change.

The most robust evidence at this level comes from two RCTs testing Parental Vigilant Care (PVC)[60] and Multi-Family Group Therapy (MFGT),[61] respectively. Each intervention emphasises communication, emotional atunement, and joint goal-setting between parents and adolescents. In the PVC trial (n = 157), parents were trained to identify "alarm signs" of problematic use and to flexibly calibrate their involvement in their child's social media behaviour through a balance of discussion, negotiation, and temporary restriction. Families in the intervention arm demonstrated significant reductions in adolescent problematic use relative to waitlist controls, with high acceptability and completion rates.[60] Similarly, MFGT (n = 92) engaged both parents and adolescents in six joint sessions focused on improving parent–child communication, emotional closeness, and fulfilment of adolescents' psychological needs. Mediation analysis confirmed that improvements in communication quality and need satisfaction explained reductions in problematic internet use, providing direct evidence for the hypothesised relational mechanism.[61]

Recent developments reflect a shift toward online and hybrid models of delivery such as the 'Tech Diet Parent Programme',[62] 'Developing Healthy Social Media Practices (DHSMP)',[63] and 'videoconference-delivered CBT (vCBT)'.[64] These approaches aim to preserve relational engagement while reducing logistical barriers. Preliminary findings show strong acceptability but limited measurable impact, largely because adolescent participation remains partial or optional. Programmes that treat parents as the sole change agents risk reproducing a control dynamic that challenges adolescent autonomy. The more promising DHSMP model begins to address this by integrating adolescents as active collaborators, encouraging joint reflection and problem-solving. [57]

A further category encompasses digital mediation tools, designed to translate family mediation into scalable, technology-assisted formats. The 'AAP Family Media Plan' allows families to co-create personalised media rules across domains including communication, safety, and screen-free time.[65] 'Google Family Link' allows parents to monitor and set app or time limits via smartphones,[66] while 'Res@t Digital' offers a CBT-based app with parallel modules for adolescents and parents, currently under clinical evaluation.[67] These tools align with evidence supporting collaborative rule-setting but remain largely unevaluated, leaving their practical effectiveness uncertain.

By contrast, interventions emphasising solely *access control,* without relational scaffolding show weaker or inconsistent effects. A Danish cluster randomised trial (n = 89 families) required families to surrender smartphones and tablets for two weeks (receiving non-smartphones as replacements) while limiting remaining leisure-time screen use on televisions and computers to 3 hours per week or less, versus a control group which continued with usual habits.[68] At 2-week follow-up, the intervention showed significant improvements in total behavioural difficulties, with the greatest improvements in internalising symptoms and prosocial behaviour. The findings suggest that strict screen-reduction interventions can yield

measurable short-term benefits but require further research to determine whether these effects persist once normal device use resumes. Further, only 92 out of 1420 families ultimately consented and completed baseline assessments, highlighting practical challenges in implementing highly restrictive interventions.

Several significant limitations constrain confidence in family intervention evidence for UK application. First, most rigorous trials occurred outside the UK; cultural differences in family structure, parenting norms, communication styles, and parent-child authority relationships may limit direct transferability. Second, evidence concentrates on families already experiencing problems or motivated enough to seek support. Most trials recruited families of adolescents showing concerning use patterns, "smartphone addiction", or diagnosed with internet gaming disorder. These selected samples may be more receptive to intervention than general populations. Moreover, the most vulnerable families — those facing poverty, parental mental health problems, single-parent households with stretched capacity, or complex family structures — are notably underrepresented in research. It remains unclear whether interventions effective for relatively well-functioning families facing technology challenges work equally well for families managing multiple stressors.

In short, relationship-centred approaches combining improved parent-adolescent communication with collaborative boundary-setting can significantly reduce problematic smartphone use. The consistent message across successful interventions is that *access control* works when embedded within warm, supportive relationships and developed collaboratively, but is less effective (or not effective) when imposed unilaterally or within conflictual family dynamics. The challenge lies in adapting these relational frameworks into lighter-touch, scalable formats suitable for diverse families and everyday contexts.

School Level

School-level interventions leverage educational institutions' extensive reach, daily contact with adolescents, and existing infrastructure for delivering health and wellbeing programs. The rationale for this implementation level rests on several premises: schools access nearly all adolescents regardless of family motivation or resources, reducing the selection bias inherent in clinic-based or voluntary programs, teachers are trusted authority figures positioned to deliver content credibly, peer environments in schools shape norms around technology use through social influence, and curriculum time devoted to PSHE (Personal, Social, Health and Economic education), digital literacy, or life skills provides natural vehicles for intervention content.

Four primary mechanisms operate at the school level with varying evidence quality. *Knowledge building* through digital literacy (including media and algorithmic literacy) and psychoeducation aims to increase adolescent understanding of how platforms are designed to capture attention and increase awareness of problematic use signs. The premise is that informed adolescents will make healthier technology choices. *Self-regulation* training teaches skills for managing technology use through impulse control practice, emotion regulation, and mindfulness techniques. *Mediation and modelling* through peer education leverages adolescent credibility and social learning, with trained student educators delivering content to peers in ways that may be more acceptable than adult-led instruction. *Access control* through school policies attempts to reduce availability and distraction during school hours.

A recent scoping review by Wang and Zhang (2025) systematically examined 35 school-based interventions for preventing problematic internet use in adolescents.[69] Their analysis reveals that existing evidence is geographically concentrated in Asia (particularly China, South Korea, Turkey), with most interventions grounded in cognitive-behavioural frameworks emphasising awareness of negative consequences and teaching self-control skills.[69] Despite differences across prevention levels in objectives, target populations, and implementation approaches, interventions converged on three core components: i) increasing awareness of problematic internet use consequences, ii) fostering appropriate attitudes and behaviours toward internet use, and iii) teaching psychosocial regulation skills.

In our review, the strongest evidence supports curriculum-integrated education programmes that blend knowledge with behaviour change techniques. The 'Digital Well-Being Schools (DWB-S)' programme trained teachers in secondary schools in North of Italy across four modules covering time/attention management alongside broader digital literacy skills.[70] Teachers then delivered structured classroom experiences where students collaboratively developed "good digital habits" — self-regulation practices reinforced daily throughout the school year and extended to family contexts. In a cluster RCT (n = 789 treatment, n = 2572 controls), students receiving the intervention showed significant reductions in problematic smartphone use and increased wellbeing, particularly among girls.

The 'Peer Education Model' applied similar principles but shifted delivery to students themselves.[71] Older students (peer educators) were trained through workshops on communication, smartphone use, and presentation skills before leading prevention sessions with younger peers. In a pre-post quasi-experimental study with Turkish secondary school students (n = 622), the peer-led intervention produced significant reductions in smartphone addiction scores compared to controls. This model represents youth involvement in both delivery and potentially content adaptation, with peer educators acting as intermediaries between adult-designed content and student audiences.

A recent UK evaluation of the Common Sense Media Digital Citizenship Curriculum (n = 215, aged 6-16) found consistent short-term improvements in students' digital literacy, online safety awareness, and critical engagement with misinformation, with teachers and students reporting the lessons as engaging and feasible within regular timetables.[72] However, outcomes varied across schools, depending on digital access, teacher confidence, and whole-school culture. The intervention primarily targeted knowledge and attitudes rather than behaviour change, leaving uncertain whether such learning translates into healthier smartphone/social media use.

Some interventions at this level use intensive, specialist-delivered formats: the 'Metacognitive Model' intervention (n = 93) delivered five weekly CBT sessions to secondary school students targeting beliefs perpetuating problematic use through trained researchers and psychologists.[73] 'Group activity-based motivational enhancement therapy' programme (GA-MET; n = 245; aged 15-18) employed an 8-week program across three phases — education/feedback, commitment/strengthening, and follow-up — with eight activities delivered by trained facilitators.[74] Both programs reported reductions in problematic use and associated outcomes including time spent on phone, risky behaviours, social media duration, and depression.

Other briefer, more scalable interventions approaches focus on building students' confidence and self-regulation rather than emphasising deficits. The 'Self-Regulatory Self-Efficacy' intervention (n = 462; aged 11-14) used four sessions grounded in a Positive Youth Development framework,[75] 'Self-Management Training' (n = 80; male adolescents aged 13-

16, five sessions) focused on time management, self-regulation, and balanced perspectives on smartphone use.[76] Both achieved reductions in smartphone and social network addiction, suggesting brief, strength-based programs can be effective. A notable outlier is the 10-minute-per-week program (n = 5312), the largest school trial identified in Japanese secondary schools.[77] Despite 10 weekly sessions combining teacher lectures with interactive modules, no effects were found on internet or smartphone addiction, highlighting that very brief programs are unlikely to change established behaviours, even with theoretically sound content.

Several small-scale interventions employ techniques targeting attention regulation, emotional management, and social media burnout. Small pilots include a social media burnout intervention for secondary school students (n = 32),[78] 'Mind Subtraction Meditation' (n = 49; aged 14-17),[78] and 'Mindful Connections' (n = 54; aged 14-17),[79] varying in duration (5–12 weeks), setting, and cultural context. All require trained facilitators and focus on self-awareness and emotion regulation. While some report reduced problematic use and improved coping, findings are mixed, and sample sizes are small.

Smartphone bans, examined across multiple countries, currently show mixed outcomes, with the evidence base rapidly evolving. In the UK, the 'Smart Schools' study (n = 1227; 30 schools; ages 12–15) compared restrictive versus permissive phone policies and found that although restrictive schools had markedly lower phone and social media use during lessons and breaks, this reduction did not translate into improvements in wellbeing, anxiety, depression, problematic social media use, motives for use, or total daily use.[80] Similarly, a study of South Australia's smartphone bans (n = 1256) found no differences between ban and non-ban schools in problematic use, academic engagement, or school belonging, with slightly higher bullying reports in schools with smartphone bans.[81]

In Norway, a large natural experiment across more than 400 middle schools found that complete smartphone bans during school day were associated with fewer specialist-care mental-health consultations and improved GPA — but only for girls, with no comparable effects for boys.[82] There is evidence that Spain's regional smartphone bans (2015) reduced bullying and improved learning in maths and sciences, though effects varied substantially by region.[83] Conversely, a Dutch study (n = 982) found smartphone bans increased emotional loneliness, especially in students with higher baseline social anxiety, whilst problematic smartphone use remained unchanged.[84] Finally, a large US evaluation of smartphone bans in Florida observed an increased in suspensions, especially among black students, before modest academic benefits emerged a year later.[85]

Collectively, these studies indicate that smartphone bans can effectively reduce phone use during school hours, but their broader impacts on wellbeing, behaviour, and wider health outcomes remain uncertain. It is beyond the scope of the present narrative review to integrate the many disparate findings. This is also a rapidly developing research area, with a high rate of new publications and considerable methodological diversity. More coordinated, longitudinal, and systematic evaluations, as well as meta-analytic review efforts, are needed to understand under what conditions, for whom, and across which outcomes school smartphone bans may support adolescents' wellbeing.

The evidence base for school interventions remains geographically narrow and methodologically heterogeneous: as Wang and Zhang (2025) note, most evaluated programs originate from Asia, with limited European studies and only one UK-specific evaluation (Goodyear et al., 2025).[80] Moreover, existing research focuses predominantly on mainstream

state secondary schools in urban areas. This neglects diverse contexts where smartphone impacts may differ: special educational and other high needs settings with distinct vulnerabilities, private and boarding schools with different pastoral structures, primary schools with younger populations and lower device ownership, and rural schools facing unique connectivity and community dynamics.

Further, teacher workload is already stretched, with 78% of teachers and 84% of school leaders in the UK reporting high stress levels.[86] This makes additional programs difficult to sustain unless they replace existing demands or align with current priorities, such as safeguarding, Ofsted criteria, PSHE curricula or mental health requirements. Teachers also report feeling under-prepared and under-resourced to teach online safety topics.[87] These competencies should be embedded within initial teacher education, rather than treated as optional continuing professional development, necessitating further training that competes with other professional development needs. Overall, school-based interventions represent one point of influence within adolescents' broader digital environments. These interventions may contribute to improved outcomes when thoughtfully designed and rigorously implemented, but the heterogeneity of effects — particularly striking gender differences and varying impacts across socioeconomic contexts — suggests the importance of careful targeting and adaptation rather than uniform implementation. Approaches that show promise in one setting cannot be assumed effective elsewhere without attention to local context, student characteristics, and school capacity.

Results: Implementation Feasibility

We coded and interpreted each intervention's feasibility across three dimensions: *translational potential* (personnel requirements, training intensity and costs, infrastructure demands, scalability constraints, and ongoing resource needs), *stage of development* (maturity of testing) and *evaluation design* (type of study, sample size and key outcomes). These dimensions inform strategic recommendations about which interventions merit philanthropic investment, at what priority level, and with what caveats (see Appendix 2 for evidence extraction key).

These dimensions are then mapped to six evidence-to-implementation categories (A–E), corresponding to progression or discontinuation decisions under the Medical Research Council (MRC) Framework for Developing and Evaluating Complex Interventions (see Table 2).[88] This approach recognises that high-quality evidence alone does not guarantee impact; rather, evidence, scalability, and contextual fit must converge for interventions to translate successfully into practice.

Under this categorisation, interventions can:

- **Proceed to Next Phase**: where the design and theory are sufficiently defined to justify large-scale evaluation.
- **Repeat a Phase**: when evidence is promising but contradictory, underpowered, or context-specific.
- **Return to Earlier Phase**: when fundamental theoretical or design problems require reconceptualization.
- **Stop**: where the intervention has proven ineffective or is not practically implementable.

Table 2. MRC-Aligned Categorisation Framework for Evaluating Intervention Feasibility; we adapted category E for this report

Category	Evaluation Design	Stage of Development	Translational Potential	MRC Decision
A: Proven and Scalable	**Strong**: ≥1 large RCT (n>100) or replicated trials; clear positive outcomes.	**Advanced:** Evaluated in controlled trials with positive outcomes.	**High:** Low-cost digital tools (apps), brief formats (single-session to 6 weeks), OR existing delivery infrastructure (teacher-delivered within schools).	**Proceed to Next Phase:** Intervention is sufficiently defined and ready for further testing or implementation**.**
B: Proven but Limited Reach	**Strong/moderate**: Well-controlled RCTs or quasi-experimental studies, demonstrating effectiveness.	**Advanced:** Evaluated in controlled trials with positive outcomes.	**Low-Medium:** Requires therapists/specialists (limited workforce), facilities/equipment, intensive time commitment (8-12 weeks).	**Proceed to Next Phase:** Intervention is sufficiently defined and ready for further testing or implementation.
C: Promising but Early Stage	**Weak - Moderate**: Pilot trials, quasi-experimental study, and/or single study (n<50), with methodological limitations (no control group, very small sample, incomplete reporting).	**Early-stage:** Pilot/feasibility demonstrated but limited scope.	**Medium-High (if effects replicate):** Format/delivery suggests scalability once validated, but current evidence insufficient.	**Repeat a Phase:** Evidence is promising but limited, underpowered, or context-specific; further evaluation is needed.
D: Widely Adopted but Unevaluated	**None:** Zero peer-reviewed controlled trials; impact unknown or inferred from indirect evidence.	**Advanced - Post-implementation:** Already deployed at massive scale or policy-mandated.	**High**: Directly impact millions of users.	**Return to Earlier Phase:** Intervention is widely used but unevaluated; basic testing is required before further development or scale decisions.

E: Inconclusive/ Mixed	Strong study design but **null or heterogeneous evidence** across multiple trials; effects depend on subgroups or mechanisms unclear.	**Advanced - Post-implementation:** Extensively tested but inconsistent results.	**Low**: Unclear, more synthesis needed.	**Stop / Repeat a Phase:** More synthesis needed to evaluate effectivity.

Category A: Proven and Scalable

Category A interventions represent the strongest candidates for immediate implementation. They have demonstrated robust and replicable effects through large RCTs or national-scale field experiments, typically with sample sizes exceeding 100 participants and clearly defined mechanisms of change. Crucially, they are low-cost, brief, and easily integrated into existing systems - whether through public app stores, browser integrations, or school and family settings.

Level	Intervention	Stage of Development	Translational Potential	MRC Decision	Mechanism of Change
App/Browser	**One Sec** *Table Row: 1*	**Post-implementation:** Public release	**High**: Automated app-based delivery, already widely deployed	Proceed to Next Phase	Friction, Self-Regulation
	Meine Zeit Ohne/ My Time Without *Table Row: 2*	**Advanced:** Evaluated in controlled trials, not yet publicly available	**Moderate**: Large evidence base but not publicly available; requires UK adaptation	Proceed to Next Phase	Access Control, Self-Monitoring
	WellSpent *Table Row: 3*	**Post-implementation:** Public release	**Moderate**: Acquired by other company so development might be difficult	Proceed to Next Phase	Knowledge Building, Self-Monitoring
Individual	**Reduce Digital Distraction Workshop** *Table Row: 23*	**Advanced:** Evaluated in field studies	**Moderate - High**: workshops replicable but may require trained facilitators	Proceed to Next Phase	Self-Regulation, Self-Monitoring, Knowledge Building, Friction
	Smartphone reduction (–1 hr/day) vs 7-day abstinence *Table Row: 24*	**Advanced:** Evaluated in controlled trials	**Moderate - High**: Reduction approach should be acceptable; implementable via OS-level tools	Proceed to Next Phase	Access Control, Self-Monitoring

	Social Media Use Reduction (10 min/day) *Table Row: 25*	**Advanced:** Evaluated in controlled trials	**Moderate**: Scalable via app-level limits but highly restrictive caps may reduce acceptability	Proceed to Next Phase	Access Control, Self-Monitoring
Family	**Parental Vigilant Care** *Table Row: 41*	**Advanced:** Evaluated in controlled trials	**High**: Fits existing parent-training structures; light-touch; no specialist therapy required	Proceed to Next Phase	Mediation/ Modelling
School	**Digital Well-Being Schools (DWB-S)** *Table Row: 53*	**Advanced:** Evaluated quasi-experimental study	**Moderate - High:** Robust evidence and uses existing school infrastructure, but large-scale rollout requires sustained investment in teacher CPD and curriculum time	Proceed to Next Phase	Knowledge Building, Self-Regulation, Mediation/ Modelling
	Peer Education Model *Table Row: 54*	**Advanced:** Evaluated in semi-experimental studies	**Moderate - High:** Relatively low running costs once established, but requires upfront investment in staff coordination and peer-educator training	Proceed to Next Phase	Knowledge Building, Mediation/ Modelling

Note: Table Row corresponds to the intervention entries in the intervention mapping spreadsheet.

Category B: Proven but Limited Reach

Category B interventions show strong or moderate evidence of effectiveness, often through well-controlled RCTs or structured quasi-experimental studies, but their implementation is constrained by delivery format. They typically require trained facilitators, therapists, or structured group settings.

Level	Intervention	Stage of Development	Translational Potential	MRC Decision	Mechanism of Change
Individual	**Social media abstinence (1-week, multi-platform)** *Table Row: 26*	**Advanced:** Evaluated in controlled trial	**Moderate:** Acceptability is low and adherence difficult to sustain, limiting scalability despite strong	Proceed to Next Phase	Access control

			experimental control		
	Satir Transformational Systemic Therapy (STST) *Table Row: 27*	**Advanced:** Evaluated in controlled trial	**Moderate:** Therapist-led format; replicable in student counselling contexts	Proceed to Next Phase	Self-Regulation, Mediation/ Modelling
	Noticing Nature *Table Row: 28*	**Advanced:** Evaluated in controlled trial	**Moderate-High:** Can be integrated into campus/wellbeing apps	Proceed to Next Phase	Self-Regulation,
	CBT vs Mind-Body Exercise (Baduanjin) *Table Row: 29*	**Advanced:** Evaluated in controlled trial	**Moderate:** CBT scalable through groups; Baduanjin requires cultural adaptation	Proceed to Next Phase	Self-Regulation, Self-Monitoring
	Physical Activity (Basketball vs Baduanjin) *Table Row: 30*	**Advanced:** Evaluated in controlled trial	**Moderate:** Easily embedded in PE curricula or university wellbeing programmes. Baduanjin requires cultural adaptation	Proceed to Next Phase	Self-Regulation
	Mindfulness-Based CBT Combined with Metaphor Therapy *Table Row: 31*	**Advanced:** Evaluated in quasi-controlled study	**Low -Moderate:** High facilitator demands and multi-week structure limit scalability	Repeat a Phase	Self-Regulation
	Group-Based Mindfulness-Based CBT for Smartphone Addiction *Table Row: 32*	**Advanced:** Evaluated in quasi-controlled study	**Moderate:** High facilitator demands and multi-week structure limit scalability	Repeat a Phase	Self-Regulation
	CBT-based short daily abstinence *Table Row: 33*	**Advanced:** Evaluated in small pilot	**Moderate:** Could be digitised as an app-based self-guided reflection tool	Repeat a Phase	Access Control, Self-Regulation

Family	**Multi-Family Group Therapy (MFGT)** *Table Row: 42*	**Advanced:** Evaluated in controlled trials, not yet publicly available	**Moderate:** Require licensed therapists and multi-family coordination	Proceed to Next Phase	Mediation/ Modelling, Self-Regulation
	Group-Based Parent Training Program *Table Row: 43*	**Advanced:** Evaluated in controlled trials, not yet publicly available	**Moderate:** Require sustained parent engagement and trained facilitator	Proceed to Next Phase	Mediation/ Modelling, Self-Regulation
	CBT-based Prevention Program for Internet Addiction *Table Row: 44*	**Advanced:** Evaluated in experimental study	**Moderate - High:** Structured, manualised curriculum that fits existing mental-health education settings with moderate training demands	Proceed to Next Phase	Self-Regulation, Mediation/ Modelling, Knowledge Building
	Parent-Child Relationship Enrichment *Table Row: 45*	**Advanced:** Evaluated in quasi-experimental study	**Moderate:** Would require psychoeducation delivery infrastructure; Iran context, unknown culture transferability	Proceed to Next Phase	Self-Regulation, Mediation/ Modelling
School	**Self-Regulatory Self-Efficacy Intervention** *Table Row: 55*	**Advanced:** Evaluated quasi-experimental study	**Moderate - High:** Short, curriculum-compatible psychoeducational module with minimal training requirements	Proceed to Next Phase	Self-Regulation
	Mindful Media *Table Row: 56*	**Advanced:** Evaluated quasi-experimental study	**Moderate:** Require facilitator training; adaptable curriculum	Proceed to Next Phase	Knowledge Building, Self-Regulation
	Group Activity-Based Motivational Enhancement Therapy programme (GA-MET) *Table Row: 57*	**Advanced:** Evaluated in cluster RCT	**Moderate:** Require facilitator training; adaptable curriculum	Proceed to Next Phase	Knowledge Building, Self-Regulation, Self-Monitoring

	Mind Subtraction Meditation *Table Row: 58*	**Advanced:** Completed RCT, widely used in South Korean schools	**Moderate:** Require trained meditation facilitators	Proceed to Next Phase	Self-Regulation, Self-Monitoring
	Self-Management Training *Table Row: 59*	**Advanced:** Evaluated but not publicly available	**Moderate - High**: Short psycho-educational training feasible for school rollout	Proceed to Next phase	Self-Regulation, Self-Monitoring

Note: Table Row corresponds to the intervention entries in the intervention mapping spreadsheet.

Category C: Promising but Early Stage

These have pilot trials, quasi-experimental designs, very small samples, incomplete reporting, and/or mixed results. Delivery formats are often scalable (apps, brief school blocks, group workshops), so a well-powered efficacy RCT (N= ≥100) with ≥3-month follow-up would be required before broad roll-out.

Level	Intervention	Stage of Development	Translational Potential	MRC Decision	Mechanism of Change
App/Browser	**StayFocused** *Table Row: 4*	**Early-stage:** Publicly available app with small-scale feasibility study	**Moderate:** Scalable but would need sustained LLM/API funding, data-governance work, and turning the prototype into a usable product	Repeat a Phase	Self-Monitoring, Self-Regulation
	Locus *Table Row: 5*	**Early-stage**: Publicly available app with small-scale feasibility study	**Moderate - High:** Android only and needs ongoing development	Repeat a Phase	Self-Regulation, Self-Monitoring, Friction

	MindShift *Table Row: 6*	**Early-stage:** Small scale pilot feasibility demonstrated; not publicly available	**Moderate:** Scalable but would need sustained LLM/API funding, data-governance work, and productisation beyond a lab prototype	Repeat a Phase	Self-Regulation, Self-Monitoring, Friction
	Nudge-Based Problematic Smartphone Use Intervention *Table Row: 7*	**Early-stage:** Two small scale pilots	**Moderate–High:** Low marginal delivery cost because it piggybacks on existing phone settings, but still needs resourcing for guidance materials	Repeat a Phase	Self-Monitoring
Individual	**Two-Stage Cognitive Restructuring + Daily Reflection** *Table Row: 34*	**Early-stage:** Small pre-post single group study	**Moderate:** Could be delivered as self-help (workbook or digital module), but current evidence is weak and substantial re-design or rigorous testing would be needed	Return to Earlier Phase	Self-Regulation, Self-Monitoring
	Package Intervention: Contingency Management + Notifications + Alternative Activities *Table Row: 35*	**Early-stage:** Small pre-post single group study	**Low - Moderate:** Contingency management is behaviourally powerful, but running incentive/points systems at scale is expensive and administratively complex	Repeat a Phase	Self-Monitoring, Self-Regulation, Friction
	Brief Mindfulness Intervention *Table Row: 36*	**Early-stage:** Small pre-post single group study	**Moderate:** Low-cost, scalable (audio format) and has demonstrated effect	Return to Earlier Phase	Self-Regulation

Family	**Tech Diet Parent Programme** *Table Row: 46*	**Early-stage:** Pilot only with very high attrition	**Moderate -High:** Asynchronous video format is technically very scalable and cheap, but real-world roll-out would still require service capacity for recruitment & reminders	Repeat a Phase	Mediation/ Modelling
	Developing Healthy Social Media Practices (DHSMP) *Table Row: 47*	**Early-stage:** Pilot feasibility demonstrated	**Moderate:** Require trained mental health practitioners to deliver	Repeat a Phase	Mediation/ Modelling, Knowledge Building, Self-Regulation
	Videoconference-Delivered Cognitive Behavioural Therapy for Parents (vCBT) *Table Row: 48*	**Early-stage:** Pilot feasibility demonstrated	**Moderate:** Telehealth scalable, but efficacy unproven	Repeat a Phase	Mediation/ Modelling, Self-Regulation
	Res@t digital *Table Row: 49*	**Early-stage:** Protocol only, trial in progress	**Moderate – High:** Condition on trial outcomes, high scalability with app-based delivery	Proceed to Next Phase	Mediation/ Modelling, Self-Regulation
School	**Mindfulness for Social Media Burnout** *Table Row: 60*	**Early-stage:** Small sample pilot quasi-experimental	**Moderate:** Require trained mindfulness facilitator	Proceed to Next Phase	Self-Regulation, Self-Monitoring
	Metacognitive Model-Based Intervention *Table Row: 61*	**Early-stage:** Preliminary experimental study	**Moderate:** Require psychologist-led CBT delivery	Proceed to Next Phase	Self-Regulation, Self-Monitoring
	Mindful Connections *Table Row: 62*	**Early-stage:** Small quasi-experimental pilot	**Moderate:** Require trained facilitator	Proceed to Next Phase	Self-Regulation, Self-Monitoring

Note: Table Row corresponds to the intervention entries in the intervention mapping spreadsheet.

Category D: Widely Adopted but Unevaluated

These interventions are widely adopted in schools, families, or operating systems but lack peer-reviewed evaluations. Most are implemented at national or commercial scale (e.g., built into iOS/Android, or mandatory curricula) and, as such, their reach is large. This makes rigorous evaluation highly valuable: if found ineffective, the evidence could influence decisions affecting millions. However, even if found ineffective, such interventions may prove difficult to modify or de-implement due to institutional inertia, policy momentum or user familiarity.

Level	Intervention	Stage of Development	Translational Potential	MRC Decision	Mechanism of Change
App/Browser	**iOS Screen Time / Android Digital Wellbeing** *Table Row: 8*	**Post-implementation:** Public release	**High**: Built-in with universal reach	Return to Earlier Phase	Friction
	Grayscale Mode *Table Row: 9*	**Post-implementation:** OS integration	**High**: Built-in with universal reach	Return to Earlier Phase	Self-Monitoring
	Forest *Table Row: 10*	**Post-implementation:** Public app	**High**: Widely used commercial app with stable infrastructure	Return to Earlier Phase	Friction
	Freedom *Table Row: 11*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach and minimal delivery burden.	Return to Earlier Phase	Self-Monitoring, Friction
	Opal *Table Row: 12*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach and minimal delivery burden.	Return to Earlier Phase	Access Control
	StayFree *Table Row: 13*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach and minimal delivery burden.	Return to Earlier Phase	Friction, Self-Monitoring
	ScreenZen *Table Row: 14*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach	Return to Earlier Phase	Friction, Self-Regulation

			and minimal delivery burden.		
	Clearspace *Table Row: 15*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach and minimal delivery burden.	Return to Earlier Phase	Friction
	Digital Detox *Table Row: 16*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach and minimal delivery burden.	Return to Earlier Phase	Access Control, Self-Monitoring
	StayFocusd (Chrome Extension) *Table Row: 17*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach and minimal delivery burden.	Return to Earlier Phase	Access Control, Friction, Self-Monitoring
	QualityTime *Table Row: 18*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach and minimal delivery burden.	Return to Earlier Phase	Self-Monitoring, Access Control
	RescueTime *Table Row: 19*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach and minimal delivery burden.	Return to Earlier Phase	Self-Monitoring, Access Control, Self-Regulation
	OffTime *Table Row: 20*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach and minimal delivery burden.	Return to Earlier Phase	Self-Monitoring, Access Control
	AntiSocial *Table Row: 21*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach and minimal delivery burden.	Return to Earlier Phase	Self-Monitoring
	Unpluq *Table Row: 22*	**Post-implementation:** Public app	**High:** Actively maintained app with broad reach and minimal delivery burden.	Return to Earlier Phase	Self-Regulation, Friction
Family	**AAP Family Media Plan (revised)** *Table Row: 50*	**Post-implementation:** Widely implemented	**High**: Actively maintained, widely used, free, clinician-endorsed tool	Return to Earlier Phase	Mediation/ Modelling, Self-Monitoring,

			with strong alignment to existing parenting infrastructures		Access Control
	Google Family Link *Table Row: 51*	**Post-implementation:** Widely used	**High**: Actively updated, integrated into Android OS, with strong parental-control functionality and high adoption	Return to Earlier Phase	Access Control
School	**Common Sense Media Digital Citizenship Curriculum** *Table Row: 63*	**Post-implementation:** Widely implemented	**High**: Widely implemented internationally and highly compatible with existing PSHE structures	Return to Earlier Phase	Knowledge Building, Self-Regulation, Self-Monitoring

Note: Table Row corresponds to the intervention entries in the intervention mapping spreadsheet.

Category E: Inconclusive/Mixed

These interventions have been evaluated, often in large quasi-experimental or RCT designs, but they have produced inconsistent or inconclusive findings when integrated across studies. While these approaches are easy to implement at scale, their evidence base remains disputed and context-dependent. Overall, this remains an active and developing research field in which more systematic, longitudinal, and context-sensitive evaluation is needed before firm conclusions can be drawn as our narrative review method is unable to support conclusions.

Level	Intervention	Stage of Development	Translational Potential	MRC Decision	Mechanism of Change
Individual	**Social media abstinence (4 week Diary Study)** *Table Row: 37*	**Advanced:** Evaluated experimental study	**Moderate:** Easily implementable but limited sustained effects	Repeat a Phase	Access Control
	Instagram abstinence (1 week) *Table Row: 38*	**Advanced:** Evaluated experimental study	**Moderate:** Easily implementable but limited sustained effects	Repeat a Phase	Access Control

	Social media abstinence (1 week; active vs passive) *Table Row: 39*	**Advanced:** Evaluated experimental study	**Moderate:** Easily implementable but negative effect in active users	Repeat a Phase	Access Control
	Social media abstinence field experiments (1 day) *Table Row: 40*	**Advanced:** Evaluated preregistered field experiments	**Moderate:** Feasible at scale but no wellbeing benefit	Repeat a Phase	Access Control
Family	**Family Screen Media Control** *Table Row: 52*	**Advanced:** Evaluated RCT	**Low:** Extreme restriction (3 hours/week) likely not sustainable or acceptable long-term; device surrender impractical in real-world settings	Stop	Access Control
School	**Class-time Micro-dose Curriculum** *Table Row: 64*	**Advanced:** Evaluated RCT	**Low:** Intervention was ineffective as 10 min/weekly sessions were too brief	Stop	Knowledge Building
	School Smartphone Bans in UK, Spain, South Australia, Netherlands, Norway and Florida *Table Row: 65-70*	**Post-implementation:** Widely implemented	**Moderate:** High for policy implementation (already widely implemented) but mixed evidence for wellbeing outcomes	Repeat a Phase	Access Control

Note: Table Row correspond to the intervention entries in the intervention mapping spreadsheet.

Taken together, the categorisation highlights a field that is advancing but unevenly matured. While a small cluster of interventions currently demonstrate clear effectiveness and scalability, the majority remain exploratory or untested. The evidence suggests that interventions embedding *friction, self-monitoring,* and *self-regulation* mechanisms offer the strongest balance of impact and feasibility. The large number of widely adopted yet unevaluated tools highlights what is most used is not necessarily what is most proven. There is an urgent need to

consolidate evidence through adequately-powered replication studies and more systematic testing across diverse populations and delivery contexts.

Results: Cross-cutting Considerations

Beyond evidence quality and translational barriers, three cross-cutting dimensions should inform strategic investment: (1) Co-design evidence and potential; (2) Cost and resource requirements; and (3) Harm-benefit balance (capacity to reduce harms while preserving beneficial uses). These dimensions cut across the patterns identified above — an intervention with strong evidence may nonetheless lack youth co-design, incur prohibitive costs, or demonstrate harm-benefit trade-offs. Below we synthesise findings on each dimension, highlighting systematic gaps and promising exceptions that can inform funding priorities.

Co-design Evidence and Potential

Youth co-design is almost entirely absent across the reviewed interventions, representing a critical missed opportunity for relevance and sustainability. Of 70 interventions reviewed, only five studies demonstrated some meaningful adolescent involvement in the design process — a crucial distinction from co-delivery, where young people help implement interventions rather than shape them.

A strong example of co-design comes from the 'Locus' app, where researchers conducted three 2.5-hour co-design sessions with nine adolescents before rolling out the app. Adolescents directly shaping the tone, timing, and notification features of this app.[89] This iterative input improved usability and engagement, with 80% of participants using the app consistently. Similarly, the 'Reduce Digital Distraction' workshop involved students in iteratively developing practical strategies, ensuring interventions reflected their actual digital contexts rather than adult assumptions. Within families, 'DHSMP' incorporated parent and adolescent feedback iteratively into session design,[90] while the 'Tech Diet Parent Programme' included co-developed exercise plans between parents and children.[91] At the school level, 'Mindful Media' stands out as explicitly co-designed with students and teachers from diverse urban schools, integrating their lived experiences to ensure cultural and contextual relevance.[92]

However, most school programs rely on top-down educational delivery rather than participatory design. 'Peer Education Model'[71] include adolescents as deliverers of content but not as co-designers, meaning their role is in implementation rather than shaping intervention content. Meanwhile, 'GA-MET'[74] and 'Self-Management Training'[76] improve group reflection and youth discussion components, but these are pedagogical rather than participatory — adolescents engage with pre-set content rather than helping to define it. Thus, while school-based interventions often include youth voices in delivery or evaluation, few embed genuine co-design at the developmental stage.

Co-design potential varies by intervention level but remains largely unrealised. Apps and browser-based tools could engage in rapid prototyping, feedback loops, and personalisation, yet very few interventions exploit these opportunities. School-based interventions also have a strong scope for student focus groups, peer-led pilot testing, and iterative curriculum design. Individual-level interventions show moderate potential, as standardised protocols can limit flexibility, but CBT approaches could benefit from giving adolescents a stronger role in defining their own values and goals. Family interventions offer moderate to high potential for

co-design, especially if adolescents help define what "healthy family negotiation" means and co-develop boundary-setting approaches, but these opportunities are rarely explored. A fundamental challenge lies in achieving buy-in from both the parent and adolescent simultaneously: interventions falter when parents are motivated but adolescents are not, or when adolescents seek support that parents are unwilling or unable to provide.

Interventions that are not co-created with youth often fail to address the contexts in which digital challenges actually occur. From an SDT perspective, youth participation in intervention design and/or delivery has direct implications for their sense of autonomy, competence, and relatedness while engaged in the intervention. Future research should treat youth co-design as a critical component, rather than an optional enhancement. Funders could strengthen the field by supporting participatory development as good practice, encouraging teams to involve adolescents across all stages of design and evaluation. Meaningful co-design integrates young people's perspectives from the earliest problem definition through to interpretation of findings and knowledge translation, rather than tokenistic consultation after key design decisions have already been made.

Cost and Resource Requirements

Resource requirements for each intervention vary dramatically, yet cost data are rarely reported in publications, limiting confident cost-effectiveness comparisons. Based on intervention characteristics, we summarise likely patterns of resource requirements and scalability across levels:

- App/browser level: Substantial upfront investment but minimal cost after development. Resource requirements include: software engineering (e.g., front-end and back-end development), behavioural science expertise (to design prompts/notifications, planning data collection), user testing and iteration and infrastructure setup (e.g., server hosting). Adolescent access is typically high given smartphone ubiquity, though accessibility may still vary by age, device type or parental restrictions.

- Individual level: CBT and therapeutic approaches typically involve 8-12 week sessions with trained CBT therapists or clinicians, thereby incurring significant cost. Session-based delivery increases participant cost. However, abstinence-based studies will be inexpensive to deliver as abstinence could be regulated and imposed en-masse with an app or through policy. However, enforcement and monitoring may require ongoing resources. Accessibility depends on participants' motivation, digital literacy and availability of qualified facilitator or therapists in their region.

- Family level: Challenges lie within recruitment and retention. Resource requirements include: recruitment and engagement (outreach, screening, enrolment, retention support), facilitator training (family therapy skills, managing parent-adolescent power dynamics, handling conflict), session delivery (facilitator time for groups or individual families) and materials (e.g., parent handbooks, adolescent workbooks). Accessibility barriers can arise if sessions are scheduled during working hours, delivered only in person, require both parent and adolescent attendance simultaneously or demand sustained engagement over multiple weeks.

- School level: Once embedded, school interventions can leverage existing infrastructure (schools, classrooms, teachers). Direct costs include curriculum development and manualisation (materials, lesson plans, activities), teacher training (initial and ongoing,

ensuring fidelity), equipment and technology (such as phone storage pouches) and fees for external providers (commonly used to deliver PSHE programs when schools lack in-house expertise). Indirect costs are substantial: teacher time for managing interventions and their consequences (such as monitoring phone policies, issuing detentions for violations, or addressing safeguarding incidents), curriculum time displacement (hours taken from other subjects or activities), and ongoing safeguarding responsibilities that may increase with technology-focused interventions. Access is typically universal for students, but will largely depend on teacher readiness and school resource capacity.

Overall, cost can vary substantially depending on interventions' core features, stage of deployment and accessibility. Across levels, app/browser level demonstrate the highest scalability and cost-efficiency. School interventions can achieve broad reach building on existing structures, but their scalability depends on curriculum integration and teacher capacity. They are easier to sustain once embedded but less flexible for rapid modification. Individual and family interventions, on the other hand, provide the most personalised support, yet they are far more resource-intensive and logistically demanding to deliver at scale. Existing models in this space are generally static once established and better suited to targeted or clinical applications rather than universal intervention.

Harm-Benefit Balance

Social media interventions are typically designed to promote wellbeing rather than impede it, and most therefore show a neutral or positive harm-benefit balance when implemented as intended. Across the evidence base, the clearest distinction lies between autonomy-supportive, skill-building interventions, which strengthen adolescents' ability to regulate their own use, and control-based approaches, which restrict access without developing underlying competencies.

Interventions that teach reflection, goal-setting, or emotional regulation, such as 'One Sec', 'Locus', 'ReDD', and 'Mobile Media Education', demonstrate consistent reductions in compulsive use, without reported harms. These align with Lahti et al. (2024), who identify self-regulation and critical reflection as key protective competencies.[93]

Restriction-based strategies such as smartphone bans, and social media abstinence trials reliably reduce short term phone use in-school, and daily screen time. The evidence on broader wellbeing outcomes remain inconclusive. Some studies report subgroup gains (e.g., reduced bullying and improved academic outcomes in Spain,[94] or mental health and academic gains for Norwegian girls),[82] while others find neutral or transient outcomes; including increases in loneliness[84] and disciplinary issues.[85] Abstinence studies also show mixed outcomes: one study found that they are generally helpful for heavy or passive users, but harmful for active, socially connected ones.[55]

These mixed findings likely reflect methodological limitations: most studies use short follow-up periods, self-reported outcomes, and non-randomised designs. These make it difficult to determine lasting and/or causal effects. Differences in enforcement, school context, and participant characteristics further complicate comparisons, and may account for the variability observed across settings. Given the growing international policy debate and emerging implementations of school smartphone bans globally, there is an opportunity and need for well-powered systematic reviews and meta-analyses using larger, more comparable datasets to

synthesise this heterogeneous evidence. Such approaches represent the gold standard for assessing the consistency, strength, and reliability of effects across studies, and would allow for examination of a broader range of outcomes — such as educational attainment, classroom dynamics, and longer-term developmental effects — that are central to policymaking but remain under-evaluated in the existing evidence base and were only partially within the scope of this review.

We developed a set of principles to guide future intervention design at *individual, family* or *school* level:

1. **Opt-in over force-in**: Interventions work best when adolescents can choose to take part rather than having them enforced. Voluntary use reduces pushback and allows adolescents to stop if the tool feels intrusive or unhelpful. Good interventions in these contexts should help young people feel more in control of their digital habits, not less, consistent with SDT principles.

2. **Build skills, not just barriers**: External constraints are safest when paired with reflective or emotion-regulation components that generalise beyond the intervention.

3. **Transparency and informed choice**: Young people should have access to clear, age-appropriate information about how interventions work, what data is collected and what evidence supports different approaches. Adolescents should be empowered to actively shape their digital habits based on genuine understanding, not positioned as passive users of opaque systems designed by adults.

4. **Personalisation**: Not everyone requires the same level of support, or support related to the same content. Lighter-touch digital tools can be helpful for general prevention or intervention, while more intensive therapeutic approaches should be reserved for those experiencing significant difficulties or clinical cases.

Limitations

This report has several important methodological and evidential limitations that constrain the strength of its conclusions. Most notably, it is not a systematic review: searches were restricted to Google Scholar and the first 100 results per level, meaning that publication, selection, language, and recency biases are likely. As such, the findings reflect a scoping and mapping exercise, identifying broad patterns and evidence gaps rather than a definitive synthesis. A narrative rather than quantitative synthesis method was used, precluding meta-analytic estimation of effect sizes or formal heterogeneity assessment. Quality appraisal was likewise brief and based primarily on study design, leaving potential risks of bias, selective reporting, and conflicts of interest insufficiently examined. Furthermore, the evidence base is geographically concentrated outside the UK, raising uncertainty about transferability to UK cultural, institutional, and policy contexts. Finally, there exists pragmatic inclusion of general internet or screen-time interventions, due to limited social media-specific research on family and school-based interventions. This introduces conceptual imprecision as the mechanisms underpinning internet use may not fully align with those driving compulsive social media use.

Conclusion

This review mapped 70 interventions across app/browser, individual, family, and school levels to understand which approaches are most effective, scalable, and ethically sound for improving

adolescent online wellbeing and, in some cases, reducing compulsive smartphone and social media use. The goal was not only to identify what works, but also to clarify why, by examining the mechanisms of change that support effective design.

Our report combined description and evaluation to move beyond cataloguing interventions toward understanding how this field operates. Mapping interventions across multiple feasibility dimensions revealed a space characterised by considerable experimentation but limited consolidation — a proliferation of creative pilot projects, few of which progress to adequately powered, rigorous replication or sustained delivery. New interventions will continue to emerge as technologies evolve and researchers identify novel approaches, and they should, particularly where they address underserved populations, test new theoretical mechanisms, or respond to emerging platform features. However, systematic investment in consolidation should be prioritised: replicating promising interventions, evaluating them across diverse contexts, and building the cumulative evidence required to support confident implementation decisions. Our implementation feasibility synthesis reveals systemic inefficiencies in how research progresses, with critical gaps between proof-of-concept studies and the evidence base required for confident implementation at scale.

Across levels, app/browser interventions demonstrate promising early efficacy, with several showing meaningful effects on self-regulation and reduce social media usage in initial trials. While replication studies and longer-term follow-ups are needed to establish sustained impact, the mechanistic plausibility and emerging evidence base provide a solid foundation for continued development. Family-level interventions also represent an important frontier with substantial potential — the strong theoretical rationale from SDT and established parenting research suggests that scalable messaging campaigns promoting autonomy-supportive mediation could achieve meaningful public health impact once the evidence base matures. Individual-level interventions show genuine promise, especially for motivated adolescents, particularly through structured self-regulation approaches. The key translational question is not whether these tools can work under study conditions, but rather how to design for sustained voluntary engagement in real-world contexts where extrinsic incentives (study participation payments) are absent.

Rather than viewing these findings as definitive, researchers, funders and policymakers should understand them as part of a rapidly developing research landscape, where outcomes appear highly context-dependent, vary substantially in magnitude, and are sensitive to implementation fidelity. Importantly, this review has focused on specific wellbeing and behavioural outcomes (e.g., academic outcomes, bullying) but has not examined other potential benefits or school-level considerations that may also be relevant to policy decisions (e.g., whether bans reduce classroom distractions, affect staff time spent on enforcement, change peer interactions during breaks.) A comprehensive systematic review and coordinated international evaluation of school-level restrictions is therefore urgently needed.

Critically, long-term effectiveness likely depends on bringing interventions across different levels together in coordinated ways. Higher-level educational programmes are more likely to sustain behaviour change with behavioural support tools (e.g., app-based interventions). Equally, these tools require reflection mechanisms (both individual and collective) to be fully effective. Individuals need to understand which app features to deploy in which situations and contexts, a process that demands extensive and probably guided reflection. Skills developed through school-based media literacy programmes, for instance, would be best served by connecting with the tools students use to regulate their digital behaviour. Family conversations

about online wellbeing need to be supported by accessible information about available technical interventions.

The implementation feasibility framework and categorisation developed in this report are designed to help funders interpret where and how to act within a fragmented evidence base. Rather than prescribing a single "best" approach, it provides a structured way to balance readiness, scalability, and ethical integrity across interventions. Category A interventions are closest to UK-wide scaling and can inform early intervention projects (e.g., 'One Sec', 'ReDD'). Categories B and C include effective but labour-intensive programmes; the strongest candidates for redesign and broader reach are CBT-based curricula and family programmes such as 'Multi-Family Group Therapy (MFGT)'. Category D identifies large-reach tools that lack independent evaluation; priority targets include widely used guidance-based interventions such as the 'AAP Family Media Plan' and 'Common Sense Media Digital Citizenship Curriculum' resources. Finally, Category E, which includes *access-control* approaches such as school smartphone bans, indicates areas where comprehensive systematic review is the most appropriate first target for investment.

Used together, these categories serve as a decision-support tool. Funders can use this framework to think about short-term impact with long-term field building, making sure that investment not only supports what works now but also strengthens the ecosystem needed to develop and sustain evidence-based approaches to addressing adolescents' compulsive social media use and well-being in the digital age.

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Appendices

Appendix 1: Theory of Change Report

Background

Concerns about the effect of social media on adolescent wellbeing have risen alongside the decline in youth mental health in recent years[1]. Interventions which aim to change interactions with social media to improve well-being have proliferated accordingly[95]. However, they have done so across disconnected domains, without strategic coherence[96–98].

Interventions intended to change social media use present complex challenges because they must account for rapidly evolving technological contexts, diverse stakeholder roles, and individual differences in vulnerability to digital environments. Social media interventions must function within constantly changing technological ecosystems; platform algorithms, device capabilities, and social norms evolve continuously. Further, revenue models which depend on a platform's ability to encourage maximum use inherently clashes with interventions designed to reduce usage, resulting in modifications that may provide regulatory compliance without meaningful behaviour change[99]. Social media platforms also offer young people benefits, which are difficult to replace through other means and require targeted and co-designed interventions.

One of the key outcomes assumed to be targeted by existing interventions is inhibitory control[100]. Defined as the ability to resist temptations and impulsive action[101], deficits in inhibitory control are consistently associated with problematic digital engagement[102]. Most existing research remains observational, meaning it is not possible to identify whether reduced inhibitory control is a pre-existing predictor of, or a consequence to, problematic use. Regardless, it represents a unifying target across implementation levels and stakeholder contexts, remaining central to discussions of intervention efficacy.

Methodology: Theory of Change

A Theory of Change (ToC) provides a framework linking interventions to outcomes through explicit mechanisms of action, enabling stakeholders to understand how different approaches may work synergistically. The ToC framework presented here was developed through a high-level literature review of the social media intervention landscape, including review of existing academic reviews on this topic[103]. Dr David Gruning, a leading researcher in social media intervention tool development, was also consulted for insight on mechanisms driving behavioural change and pathways for scaling interventions. It represents a working hypothesis rather than established fact.

This ToC is also designed to map on to a well-established theory of motivation and behavioural change, Self-Determination Theory (SDT)[104]. SDT posits that human motivation and well-being are supported by three core psychological needs: *autonomy, competence,* and relatedness[a]. Please see Appendix 1.2 for detailed version of ToC framework and Appendix 1.3 for high-level version of ToC framework.

[a] See glossary for technical definitions.

According to this theory, successful interventions will foster user control (autonomy), enhance self-efficacy (competence), and/or strengthen social connection (relatedness). SDT provides a robust theoretical foundation for developing interventions that address users' psychological needs and therefore produce meaningful changes in motivation and behaviour[95].

We mapped interventions across six implementation levels *(*contexts in which social media interventions enact their effects: *platforms, devices, individuals, families, school and society* – see Table 1*)*[95]*,* to six mechanisms of change (*friction, self-monitoring/awareness, access-control, self-regulation, knowledge building and mediation/modelling)* described in the glossary (Appendix 1). The research team derived these mechanisms following high-level review of existing interventions. We identified mechanisms based on theoretical plausibility and available evidence for each intervention, and then grouped into the following categories, which are reviewed below:

- *Friction:* Automatic/impulsive behaviour is interrupted by the addition of time or some unrelated action.

- *Self-monitoring/awareness:* Redirection of attention toward intentional use with feedback and reflective tools.

- *Access Control:* Reduced access to online spaces promotes seeking alternative/offline sources of social rewards and discourages habitual seeking of online rewards.

- *Self-regulation:* Capacity for self-reflection and emotion regulation during technology use.

- *Knowledge Building:* Knowledge of risks allows for critical evaluation of use, and supports healthy use.

- *Mediation/Modelling:* Changes in social norms and expectations around technology use.

Platform

Platform-level interventions are features embedded directly into social media platforms, modifying user experience from within the app environment[95]. Unlike external tools, these interventions exploit platforms' ability to access behavioural data and shape engagement, redirecting design features away from maximising use toward intentional engagement. They typically exert their effects via two pathways: *(i) friction* and *(ii) self-monitoring/awareness.*

Friction-based approaches introduce deliberate interruptions to disrupt automatic scrolling, thereby making it more difficult to engage in the 'flow' state proposed to be induced by scrolling[105]. Examples include Instagram's "Take a Break" reminders[97] and TikTok's 60-minute usage limits that require passcode re-entry[106]. Other examples include muting

notifications from commonly used apps via notification controls. Based on pre-existing theories of addiction, these tools assume problematic use stems from habit loops[107,108] that can be disrupted through strategic pauses[109]. As such, the effectiveness of friction-based platform interventions is moderated the strength of existing usage habits, and the ability of adolescents to bypass or disable restrictions.

Self-monitoring/awareness approaches function through information provision, by making automatic usage patterns recognisable to conscious awareness. A common example includes providing users with summaries of their usage over the course of the day, week and month. Evidence shows that users systematically underestimate their daily screen time, whilst making this discrepancy obvious can create a "usage awareness shock" that motivates change[110,111]. The effectiveness of self-monitoring platform interventions depends on emotion regulation skills: some may experience shame and related avoidance of awareness cues.

Table 1

Point of Intervention		Overview	General example
1.	Platform	Interventions that manipulate features of social media platforms to enhance well-being.	Manipulation of social media features (e.g. number of likes).
2.	Browser/App	Interventions that operate within devices, such as smartphones and use device features to change social media use and enhance wellbeing.	Screentime reports.
3.	Individual	Interventions that target social media behaviours within the context of the user's life to enhance well-being.	Digital detox.
4.	Family	Interventions that aim to change individual social media behaviours within the family unit, or close social circles to enhance well-being.	Parental social media rules.
5.	School	Interventions that aim to enhance well-being by changing social media behaviours in the school context.	School phone bans.
6.	Society	Broad interventions that aim to systematically enhance well-being by changing social media behaviours.	National bans for under 16's.

Contexts of SMI use: *Table showing the different contexts in which Social Media Interventions act, adapted from Skeggs and Orben[95]. Each context represents a different level of user experience. General examples and explanations of such interventions are provided.*

In principle, *friction* and *self-monitoring/awareness* aim to strengthen inhibitory control by disrupting reward processing associated with automatic behaviour, and by fostering conscious reflection on one's goals. Short-term outcomes include increased awareness of usage and small reductions in compulsive engagement. However, long-term effects are limited. Internal company-led research suggests that *friction*-based approaches may have minimal real-world impact: unverified reports state that TikTok's own testing of their 60-minute daily limit found it reduced usage by only 1.5 minutes on average[112]. Similarly, rigorous experimental studies have found null effects for notification controls on actual behaviour outcomes[113]. A consistent challenge discussed by researchers is user adaptation: adolescents quickly learn to bypass or ignore interventions.

Browser/App

Browser and app-level interventions are delivered through device operating systems (e.g., Apple Screen Time) or third-party applications (e.g., One Sec). These operate independently

of social media companies' business models, providing users with comprehensive control across applications and platforms. They target change through the two primary mechanisms also discussed above: *(i) friction* and *(ii) self-monitoring/awareness.*

Friction is created by creating strategic delays or barriers to the opening of an app or the access to content. One Sec app, for example, introduces a "mindfulness pause" before launching a target app, which Grüning et al. found reduced app use by more than half in a controlled trial[29]. An RCT in a population of Danish consumers found that a set of friction-based interventions significantly reduced social media use, leading to an average reduction in daily social media activity of 31-36%[114]. The greatest effect was observed among those with the highest baseline social media use. The most effective intervention involved a six-second waiting period, accompanied by a calming animation, before an app opened. Similarly, settings can enforce downtime periods or notification restrictions that interrupt automatic cue-response and reward patterns. Notification restrictions do not allow for automatic app-opening that accompanies the notification, meaning that users need to consciously decide that using the app is what they want.

The key distinction from the way in which *friction* acts in browser/app-level interventions lies in user control and customisation. Unlike in platform-level interventions, here users can adjust delay intensity, select which apps to target, and modify restrictions based on personal preference. Still, the possibility of disabling or uninstalling interventions creates implementation challenges across levels.

Browser/app interventions targeting *self-monitoring/awareness* aim to increase awareness of cross-platform usage patterns, reduce impulsive app openings, and foster greater intentionality in technology choices. They include the apps which introduce a brief pause before launching social media sites, alongside features such as in-built screen time reports. As above, short-term outcomes include enhanced behavioural control and reduced automatic engagement, while intermediate goals focus on improved inhibitory control and decreased compulsive checking behaviours. However, the very flexibility that makes these tools attractive often undermines their impact: workarounds and uninstall–reinstall cycles may reduce effectiveness, while negative emotional reactions to feedback (e.g., frustration, disappointment) risk alienating those who might benefit most[115].

Individual

Individual level interventions target users directly, focusing on immediate behaviour change or psychological skill development. The research base at this level largely consists of abstinence studies conducted in various environments (e.g., controlled laboratory experiments to at-home interventions) and interventions which teach emotion regulation skills. Two key mechanisms are targeted: *(i) access control* through abstinence protocols, and *(ii) self-regulation* through emotion regulation training.

Interventions targeting *access control* operate by removing or reducing availability of social media. For example, Hunt et al.'s randomized controlled trial (RCT) asked adult participants to

limit Facebook, Instagram, and Snapchat use to 10 minutes per platform, per day for three weeks[116]. It found significant reductions in loneliness and depression in trial participants compared to controls. Similarly, Allcott et al. conducted a large-scale Facebook deactivation experiment in adults, finding that a four-week abstinence period reduced online activity, increased subjective wellbeing, and freed up time for offline social interaction[117].

Interventions targeting *self-regulation* are intended to strengthen capacity for regulation of internal experiences, like thoughts and emotions, which can perpetuate problematic technology use. These programs train users to notice emotions and related urges, and respond with greater intentionality. Given that engaging inhibitory control is generally experienced as aversive [118], developing one's ability to navigate aversive emotions is critical in persisting during effortful tasks (e.g., like resisting urges to use social media). For example, RCT evidence testing an eight-week mindfulness-based cognitive therapy intervention found the mindfulness group showed significantly lower problematic mobile phone use, with effects maintained at least two months post-intervention[119]. The population studied in this RCT were adults.

Together, these individual-level strategies reveal two complementary approaches to controlling problematic use: access restriction disrupts automatic behaviour in the short term, while self-regulation provides internal resources for longer-term self-control.

Limitations include significant retention challenges. Further unintended consequences differ by mechanism: *access control* risks social disconnection, cravings, or rebound use, while *self-regulation* approaches can be difficult to sustain in the long term, and can have minimal impact if poorly implemented.

Family

Family level interventions leverage existing family systems, parental authority, and social learning processes to shape technology use. They primarily facilitate change through two key mechanisms: *(i) access control,* and *(ii) mediation/modelling.*

By setting curfews, device-free zones, or negotiated household agreements (i.e., interventions targeting *access control*), parents aim to reduce screen time. Longitudinal research has shown that parental rule-setting is associated with reduced problematic media use, better sleep, and stronger academic outcomes[120]. Contemporary public health advice, such as the American Academy of Pediatrics' revised Family Media Plan, encourage collaborative rule-making. This recognises that autonomy-supportive strategies enhance adherence and family cohesion more effectively than strict enforcement[121].

Yet rules alone are rarely sufficient. Adolescents find workarounds, from creating secondary accounts to disabling parental controls. Moreover, restrictions can provoke secrecy or conflict. To prevent this, research distinguishes between restrictive, instructive, and co-viewing mediation styles[122], with evidence consistently showing that active, instructive mediation - where parents guide discussion and reflection - fosters autonomy and critical thinking. Joint engagement has likewise been found to strengthen family bonds and facilitate open

conversations about online experiences[123]. These are alternatives to more restrictive interventions.

Parental modelling of a balanced relationship to technology (i.e., an intervention targeting *mediation/modelling*) is equally powerful. Studies show that when parents themselves reduce "phubbing" behaviours (i.e., checking their phones during conversations), they not only improve the quality of parent-child relationships but also reduce adolescents' risk of developing smartphone addiction[124]. More formalised interventions build on this principle; family-based therapy programmes have demonstrated significant reductions in adolescent internet addiction severity, particularly when parental engagement is strong[125].

The intended outcomes of these approaches are multi-dimensional. In the short term, families report less conflict over screen time and improvements in daily routines such as sleep. Over time, family interventions can foster greater inhibitory control, healthier digital norms, and stronger relationships, which in turn support better mental health outcomes[125]. At the same time, risks are evident. As is the case with above, rules that are too strict can backfire, driving oppositional behaviour and adding strain to the home environment. Moreover, relational approaches demand time, digital literacy, and emotional energy, with resources unequally available across families. Parents' own device habits can also undermine credibility, leaving adolescents sceptical of guidance that feels hypocritical.

School

Community-based policy frameworks, such as school-wide interventions, represent powerful levers for shaping adolescents' digital engagement. School-based interventions operate through three primary mechanisms: *(i) access control* (restricting opportunities for problematic use), *(ii) knowledge-building* (embedding digital literacy into school policy), and *(iii) mediation/modelling* (demonstration of healthy digital habits).

School-based phone restrictions (i.e., interventions targeting *access control*) are increasingly common. The UK Department for Education's 2024 guidance encourages schools to limit or ban phones during the school day, aiming to reduce distraction and foster better learning climates[126]. Stricter policies have been associated with improved wellbeing and reduced in-school phone use, though outcomes vary depending on school culture and enforcement fidelity[127].

Parallel to blanket restrictions on access, educational and psychoeducational programmes target *knowledge building*. The EU Digital Education Action Plan (2021–2027) frames digital wellbeing as a curricular priority, embedding safe and balanced technology use into school systems across member states[128]. Empirical evidence supports this: in the UK, an evaluation of the Digital Citizenship Curriculum found improvements in students' knowledge of online safety and wellbeing[129]. Similarly, media literacy integration programmes in Canada and Australia have helped students develop critical evaluation skills, reducing susceptibility to misinformation and encouraging more intentional social media use[130].

School-level interventions also leverage *mediation and modelling* to reinforce healthy norms. Schools promote positive digital habits through teacher guidance, peer-led initiatives, and structured co-use activities. Peer-led initiatives empower students to support one another in fostering balanced engagement, while co-use activities provide opportunities for dynamic discussion. Through consistent effort, schools can cultivate an environment that prioritises intentional and well-informed digital activity.

The intended outcomes of these interventions extend beyond limiting screen time. At their best, they have the capacity to create healthier school environments, foster attentional control, and equip adolescents with skills in digital literacy and critical thinking. Long term, they aim to strengthen resilience to online risks, support academic and social development, and reduce inequalities in wellbeing. By incorporating modelling, these interventions demonstrate positive digital behaviours in real-world contexts, reinforcing lessons from knowledge-building curricula and providing adolescents with concrete examples of responsible engagement.

Yet unintended consequences and adaptation challenges remain. Strict bans may restrict autonomy, provoke covert use, and/or stigmatise students who struggle to comply[131]. Knowledge-building curricula require significant teacher training, parental reinforcement, and timetabling, which could strain under-resourced schools. Modelling efforts depend on consistent, high-quality demonstration of desired behaviours, and may be undermined if authority figures themselves display poor digital habits.

Society

Beyond schools, governments continue to consider broader restrictions. Norway recently proposed raising the minimum age for social media use from 13 to 15, aiming to delay exposure to harmful content and improve adolescent sleep and wellbeing[132], whilst the Australian government has indicated they intend to introduce a ban on social media use in under-16s. Such age-limits signal growing shift towards the opinion that youth wellbeing is a public health issue, not just an individual or family responsibility.

Similarly to the school-based interventions described above, societal interventions target *(i) access control, (ii) knowledge building* and *(iii) mediation/modelling* mechanisms. Age-based restrictions (i.e., targeting *access control*) introduce blanket bans to all those under a certain age, whilst public campaigns and community programs shape social expectations by exemplifying balanced engagement (i.e., via *mediation/modelling*). As in the case of school-based modelling above, these approaches operate by demonstrating desired behaviours, encouraging reflection, and scaffolding adolescents' development of balanced goals related to technology use. Finally, increasing public awareness and knowledge through, for example public health campaigns (i.e., *knowledge building),* increases resilience to misinformation and promotes critical thinking on the benefits and risks posed by social media.

Societal-level interventions, whether at school or beyond, remain controversial, diverse and much discussed. They are often cited as restrictive, pushing users to engage with inappropriate or even illicit methods to access social media platforms. Policy-level restrictions, such as age limits, are only as strong as their enforcement, and risk widening inequalities if some groups are better able to circumvent them than others. They are also quite difficult to evaluate, as this

requires considerable resources, coordinated effort, and planning across levels of government and society.

Integration with Social Determination Theory

Self-Determination Theory (SDT) provides a unifying framework for understanding how social media interventions can support sustained, intrinsically motivated behaviour change.

Each mechanism targets different SDT needs (autonomy, relatedness and competence) with varying effectiveness: *friction* primarily enhances autonomy, supporting intentional decision-making when users control barriers; it also indirectly builds competence through repeated inhibitory control practice. *Self-monitoring/awareness* strongly supports autonomy by providing objective data without prescribing responses, also potentially developing competence as young people observe themselves making progress towards their goals. The *access control* mechanism creates immediate behavioural change while undermining autonomy and providing limited competence development, though it may serve as temporary scaffolding for subsequent skill-building. *Self-regulation* strongly supports autonomy and competence by bolstering metacognitive awareness (i.e., one's capacity to reflect on their thoughts and feelings) and self-knowledge, and by empowering young people with emotion regulation skills. *Mediation/modelling* operates primarily through relatedness, shaping behaviour via social influence and observational learning, while supporting autonomy and competence when implemented collaboratively rather than authoritatively. *Knowledge building* directly targets competence by developing knowledge and critical thinking, and self-regulatory capacities that enable autonomous engagement, with potential for enhancing relatedness through collaborative learning.

While SDT provides a framework which unifies each mechanism, complementary models and theories may be at play when considering each mechanism in isolation. For example, theories of habit could offer elaboration on *friction* and *access* pathways[133], while dual process models might inform our understanding of the balance between automatic and intentional behaviour which is targeted via *self-monitoring/awareness* and *self-regulation*[134].These additional theories could inform mechanisms that SDT alone may not capture.

Conclusion

Social media interventions continue to proliferate, but the response remains uncoordinated. Interventions exist across six interactive levels with six mechanisms, each representing their own opportunities and challenges.

Platform-level and browser/app interventions target change through *friction* and *self-awareness.* Flexibility and workarounds impede their aim to highlight usage patterns and promote intentionality. Further interventions that target users directly, focusing on *access control* and *self-regulation,* are hindered by attrition in the long-term, in part due to unintended consequences such as social disconnection (in the case of *access control).* Family level interventions facilitate change through family systems, by targeting *mediation/modelling* and

access control. Whilst such interventions can promote both healthier digital behaviours and resilient parent-child relationships, strict rules can backfire. School level interventions target *access control, knowledge building* and *mediation/modelling* to build new social norms surrounding balanced digital engagement. Finally, societal level interventions, acting via *access control* mechanisms among others, recognise the growing fact that healthy digital exposure constitutes a public health need, rather than an individual responsibility.

An understanding of such interventions and their mechanisms of action is a prerequisite to enacting meaningful behavioural change. Using SDT and complementary theoretical approaches, researchers and policymakers can begin to move beyond atheoretical interventions towards a unified strategy, promoting a common goal of safe digital technology use in adolescence and beyond.

Appendices

Appendix 1.1: Glossary

Access Control: Reduced access to online spaces promotes seeking alternative/offline sources of social rewards and discourages habitual seeking of online rewards.

Algorithmic Design: The way social media platforms organise and present content to users, often optimised to maximise engagement and time spent on the platform.

Automatic Cue-Response Patterns: Unconscious behavioural sequences where environmental triggers (like phone notifications) immediately lead to habitual actions (like checking social media) without conscious thought.

Autonomy: One of the three core psychological needs as described by Self Determination Theory. Refers to the need for volition and self-direction.

Circumvention Behaviours: Actions users take to bypass or work around digital restrictions, such as deleting and reinstalling apps, using different devices, or creating secondary accounts.

Competence: One of the three core psychological needs as described by Self Determination Theory. Competence refers to the need for mastery and effectiveness.

Friction: Automatic/impulsive behaviour is interrupted by the addition of time or some unrelated action.

Habit Loops: Automatic behavioural cycles consisting of a trigger (cue), routine (behaviour), and reward that become deeply ingrained through repetition.

Inhibitory Control: The cognitive ability to pause, reflect, and regulate impulses - to stop automatic behaviours and make deliberate choices instead.

Knowledge Building: Knowledge of risks allows for critical evaluation of use, and supports healthy use.

Mechanism of Change: The underlying psychological, behavioural, or social process through which an intervention produces its effects on user behaviour.

Mediation: Changes in social norms and expectations around technology use.

Modelling: Demonstrating healthy technology behaviours for others to observe and potentially imitate, such as parents showing balanced phone use or teachers exhibiting good digital habits.

Metacognitive Skills: The ability to think about one's own thinking processes, including awareness of one's habits, triggers, and behavioural patterns.

Persuasive Design Features: Elements built into digital platforms specifically intended to capture and maintain user attention, such as infinite scroll, variable reward schedules, and social validation mechanisms.

Phubbing: Phone snubbing - the practice of ignoring someone in favour of looking at a mobile phone during face-to-face interactions.

Problematic Use: Digital technology use that interferes with daily functioning, relationships, or wellbeing, though not necessarily meeting clinical addiction criteria.

Rebound Effects: When post-intervention behaviour exceeds pre-intervention levels, often occurring after restrictive interventions are removed.

Relatedness: One of the three core psychological needs as described by Self-Determination Theory. Refers to the need for connection and belonging.

Self-Determination Theory (SDT): A psychological framework identifying three basic psychological needs (autonomy, competence, relatedness) that drive motivation and sustainable behaviour change.

Self-monitoring/awareness: Redirection of attention toward intentional use with feedback and reflective tools.

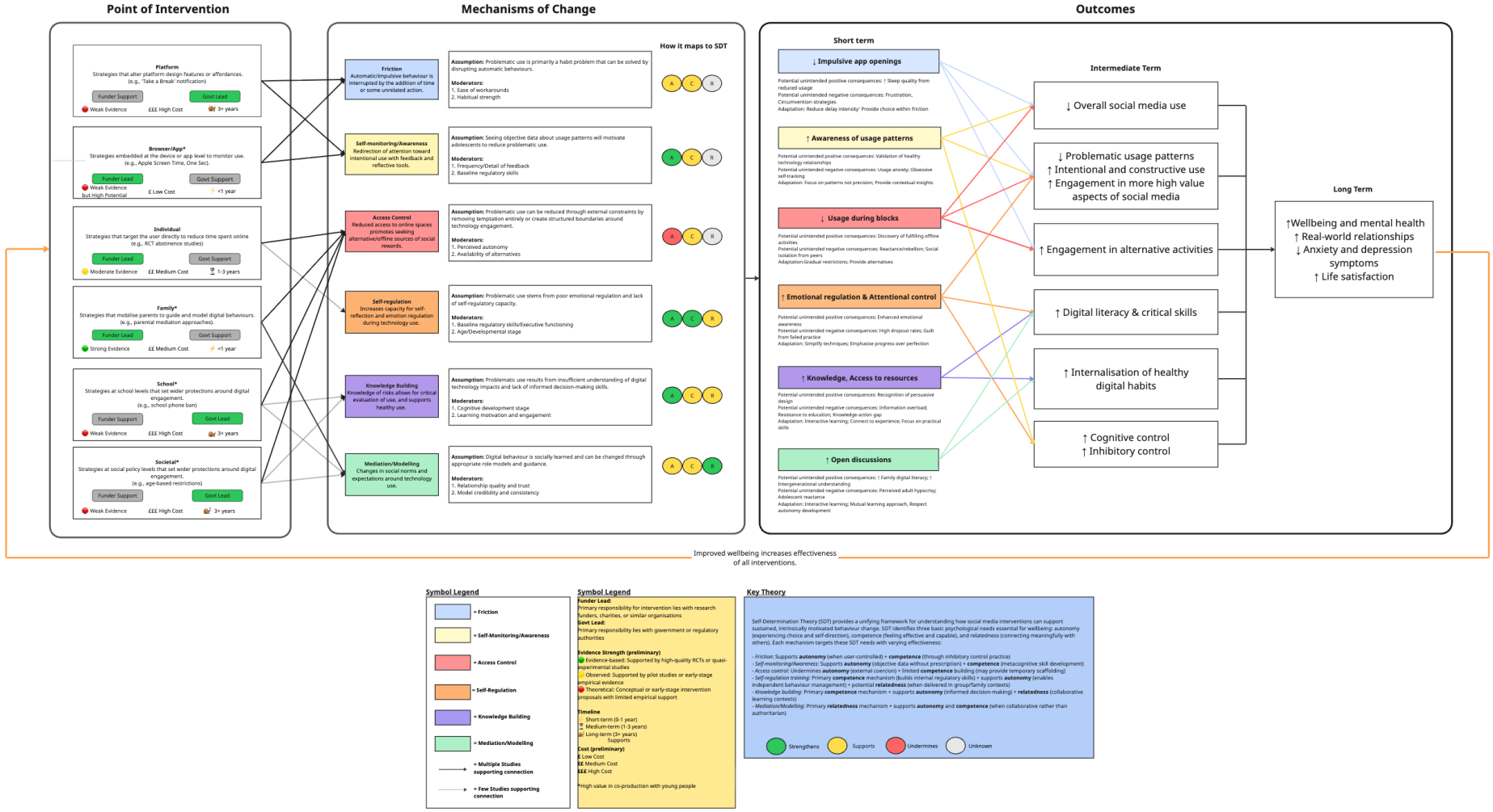
Self-regulation: Capacity for self-reflection and emotion regulation during technology use.

Social Learning Theory: A framework explaining how people learn behaviours by observing others, requiring attention, memory, ability to reproduce the behaviour, and motivation to do so.

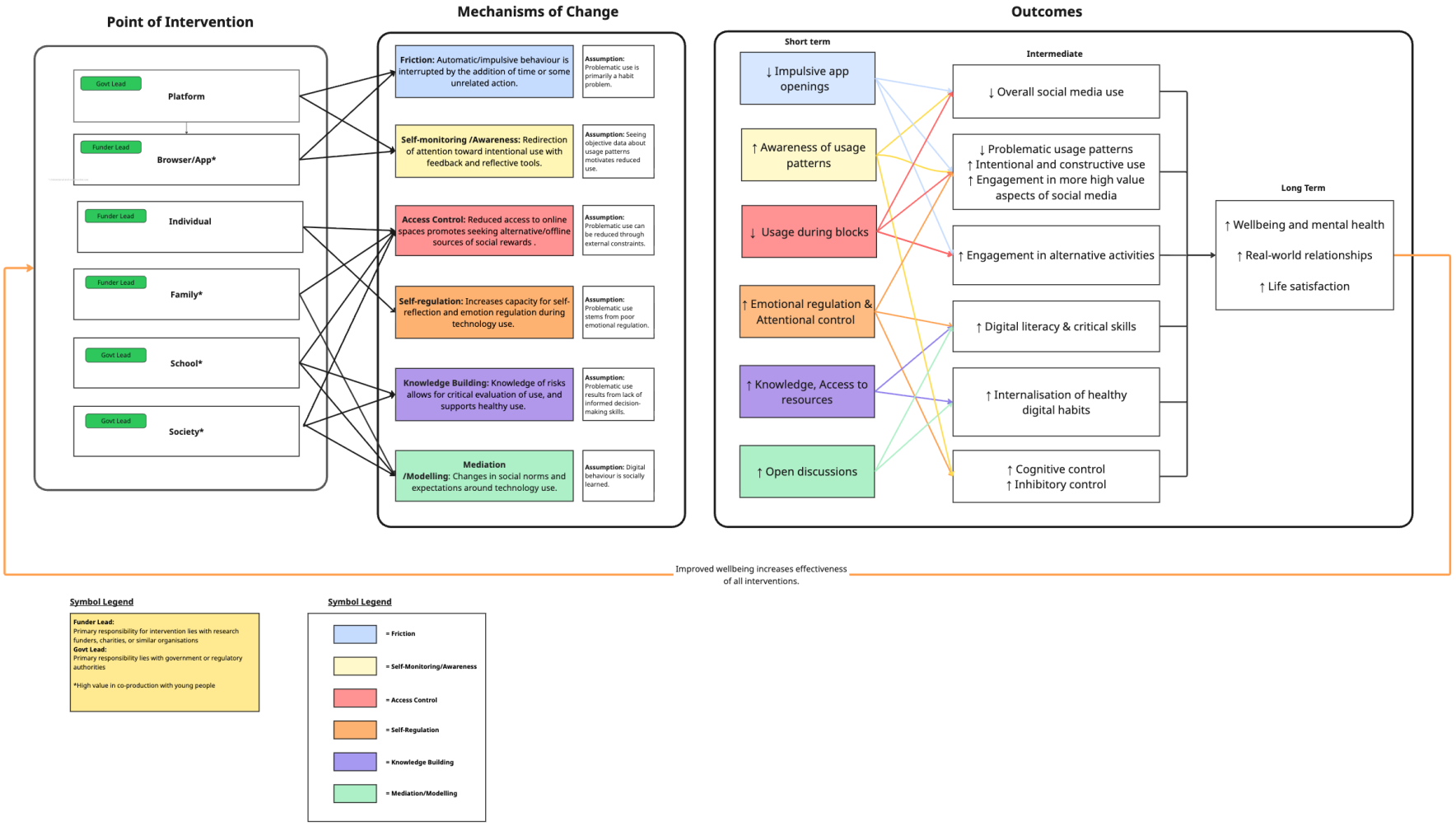
Theory of Change: A framework that maps out how interventions are expected to lead to desired outcomes by specifying the mechanisms and steps involved.

Usage Awareness Shock: The surprise or motivation that can result when people see objective data about their technology use that differs significantly from their self-perceptions.

Appendix 1.2: Theory of Change Diagram (detailed version)



Appendix 1.3: Theory of Change (high-level version)



Appendix 1.4: Implementation Feasibility Table

Table 1

Table showing the implementation feasibility of each level of intervention across key decision-making criteria.

NB: This is a preliminary draft, which will be selectively extended and deepened for Phase II of the project.

The framework emphasises an approach that matches stakeholder capabilities to intervention characteristics rather than assuming all approaches require similar coordination. Funders should lead Individual, Browser/App and Family interventions where independence from commercial pressures, research expertise, and alignment with wellbeing outcomes are crucial. Government must lead Platform and School/Societal interventions requiring institutional coordination, and enforcement mechanisms that only constitutional powers can provide. Short-term "quick wins" through Family and Browser/App interventions can generate early evidence and behavioural gains, while longer-term investments in regulatory and institutional interventions address population-level outcomes. This transforms fragmented investment approaches into coordinated strategy.

Level	Evidence Type	Timeline	Co-Production Priority	Estimated Cost	Lead Stakeholder
Platform	**Theoretical**, but limited due to industry control.	**Long-term*:** Requires regulatory cycles, legal frameworks, international coordination, and compliance monitoring.	**Low:** Platforms typically do not prioritise co-creation.	Regulatory development, infrastructure, operational costs, legal contingencies.	Government.
Browser/App	**Observational** Independent tools enable objective evaluation of use.	**Short-term*:** Rapid development and deployment due to platform independence.	**Moderate:** Appeal and usability require youth perspective.	User testing, iteration, deployment, maintenance.	Funder.
Individual	**RCT** with limited real-world transfer.	**Medium-term*:** trial design, participant recruitment, implementation, and follow-up.	**Low:** focused on controlled research environments.	Salaries, recruitment, intervention delivery, data collection.	Funder.

Family	**Mixed** observational and RCT designs, with limited digital-specific validation.	**Short-term:** leverages existing delivery networks and infrastructures.	**High:** insight into family dynamics required.	Training materials, program delivery, monitoring and evaluation, existing network adaptation.	Funder.
School	**Experimental/Observational** with mixed outcomes; potential population-level impact but causality unclear.	**Long-term:** curriculum reform, teacher training, coordination, and monitoring.	**High:** implementation fidelity depends on youth co-operation and buy-in.	Policy development, teacher training, curriculum, institution co-ordination, monitoring, evaluation.	Government.
Societal	**Observational**: potential population-level impact, but causality unclear.	**Long-term:** regulatory framework changes, legislation and norm building.	**Hight:** Efficacy depends on acceptability and public willingness to endorse new norms.	Legislation and regulatory changes, public health campaigns, influencer endorsement.	Government.

Key: = low, = medium, =high.

*: Long-term=>3 years, medium-term =1 - 3 years, short-term= <1 year.

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Appendix 2: Extraction Key for Intervention Mapping Table

Field	Brief description	Guidance	Permissible entries	Notes
Intervention name				
Summary/Description				
Target population	Provide a description of demographics targeted in the intervention.	General population, University Students, Adolescents, free text description	General population University Adolescents High School Primary School Family (...)	
Target level*	Only for App/Browser level.	Specify whether it is general smartphone use, all visual app interfaces, or user selected apps.	Gen-SMU User-selected apps Other*	*Internet, Screens, Smartphones
Mechanism of Change	ToC Mechanism.	Specify mechanism from six available: friction; self monitoring/awareness; access control; self-regulation; knowledge building; mediation/modelling.	Friction Self-Monitoring Access Control Self-Regulation Knowledge-Building Mediation/Modelling	
Citation	Full citation of work.	APA formatting.		
Researchers	Organisation and project collaborators.	E.g. Apple Inc., Google Inc.		

Evaluation Design	Free-text description of level of evaluation of intervention.	Provide detail of whether there has been an RCT evaluation, or any independent peer-review. Brief comment on results	E.g. 'No independent peer review'
Level of Evidence	Evaluation of level of evidence provided for efficacy of the intervention.	Use the MRC Complex Interventions Evaluation guidance as a foundation - https://www.bmj.com/content/bmj/374/bmj.n2061.full.pdf. Consider **context, programme theory, stakeholder involvement, key uncertainties, built-in refinement, economic considerations.**	Proceed to next phase (intervention is defined sufficiently to be tested) Return to earlier phase (fundamental problems with intervention design/theory, need to reconceptualise before continuing) Repeat a phase (if there is contradictory evidence/underpowered or limited scope, different context requires re-testing) Stop – not viable (proven not to work/works but not implementable)
Stage of development.	Description of stage of development of project.	Conceptual/early-stage/advance/post-implementation.	Conceptual Early-stage (proof of concept) Advanced (evaluated in research but not available yet) Post-implementation (publicly available)

Codesign potential	Briefly describe and colour-code co-design potential.	Limited/Moderate/High	Limited Moderate High
Translational potential	Provide evaluation of translational potential/scalability.	Low/Moderate/High	Low Moderate High
Cost	Provide rating alongside a brief description of major costs.	£/££/£££ - workshop costs, app development costs, subscription.	£ - Workshop costs.
Harm-Benefit balance	Provide a judgement of the capacity of the intervention to retain the benefits of technology while addressing its harms.	Low/Moderate/High	Low Moderate High Limited Evidence

Appendix 3: Glossary

Access Control (AC)
External restrictions on technology use, such as time limits, app blocking, content filtering, or device-free zones.

Cognitive Behavioural Therapy (CBT)
A structured psychological treatment addressing unhelpful thinking patterns and behaviours through skill-building, goal-setting, and cognitive restructuring.

Co-Design
A participatory design approach involving end-users (e.g., adolescents, parents, teachers) in intervention creation or refinement to enhance relevance, acceptability, and engagement.

Compulsive Use
Persistent, repetitive smartphone or social media use that is difficult to control and interferes with daily functioning or wellbeing; often linked to deficits in inhibitory control.

Effect Size
A measure of how large an intervention's impact is

Friction
A design feature that introduces a small delay or extra action before a habitual behaviour (e.g., opening an app), prompting reflection and disrupting automatic use.

Heterogeneous Effects
Variation in intervention outcomes across subgroups (e.g., gender, baseline use, motivation), indicating that certain strategies may work better for some populations than others.

Inhibitory Control
The cognitive ability to pause, reflect, and suppress automatic impulses in favour of deliberate, goal-directed action.

Knowledge-Building (KB)
Educational activities that enhance awareness of technology's impacts, promote digital literacy and online safety, and develop healthy digital habits.

Mechanism of Change (MoC)
The psychological, behavioural, or social process through which an intervention achieves its intended effects

Mediation Analysis
A statistical method used to test whether an intervention's effects on outcomes operate through intermediate processes (mediators), such as improved self-control or awareness.

Meta-Analysis
A statistical technique used within or following a systematic review to quantitatively combine results from multiple studies, producing an overall estimate of effect size and exploring sources of variation across studies.

Mindfulness-Based Intervention
An approach teaching present-moment awareness and non-judgemental observation of thoughts and emotions to promote intentional technology use and emotional regulation.

Modelling
Demonstrating healthy technology behaviours for others to observe and emulate, such as parents modelling balanced phone use or teachers practising good digital habits.

Pilot Study
A small-scale preliminary study assessing feasibility, acceptability, and procedures before a full-scale evaluation.

Pre-Post Design
A research design measuring outcomes before and after an intervention without a control group; useful for feasibility studies but limited in causal inference.

Problematic Smartphone Use (PSU)
A behavioural pattern of excessive or uncontrolled smartphone use associated with distress, impaired social functioning, or reduced wellbeing.

Problematic Social Media Use (PSMU)
A specific form of problematic use characterised by compulsive engagement with social networking platforms, often linked to anxiety, depression, or social comparison.

Quasi-Experimental Design
A research design comparing intervention and control groups without random assignment; can suggest associations but is vulnerable to selection bias.

Randomised Controlled Trial (RCT)
The gold-standard experimental design in which participants are randomly assigned to intervention or control conditions to establish causal effects.

Self-Determination Theory (SDT)
A psychological framework proposing that sustainable behaviour change depends on fulfilling three basic psychological needs: autonomy, competence, and relatedness.

Self-Monitoring (SM)
Tracking one's own digital behaviour (e.g., screen time, app usage) to enhance awareness and guide intentional change.

Self-Regulation (SR)
The ability to manage attention, emotions, and impulses to align behaviour with long-term goals, even in the face of immediate temptations or distractions.

Systematic Review
A rigorous, transparent method for identifying, appraising, and synthesising all available research evidence relevant to a specific question. Follows predefined protocols to minimise bias and ensure reproducibility.

Theory of Change (ToC)

A conceptual model mapping how an intervention is expected to lead to specific outcomes by identifying key steps, mechanisms, and contextual factors.

Translational Potential
The likelihood that an intervention can be successfully implemented beyond research settings, considering scalability, cost, and contextual fit.

Universal Prevention
An intervention designed for broad populations, regardless of individual risk level, typically brief and delivered through accessible channels such as apps or school programmes.