

PERSPECTIVE

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Applying the commercial determinants of health framework to understand how digital platforms influence child and youth wellbeing

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Abstract

The influence of social media on youth mental health has been under debate in scientific communities over the last several years. In this perspective paper, we suggest that there is a need to shift focus away from finding ways to ascertain causal connections at the global scale toward developing solutions that address existing demonstrated harms. Specifically, we suggest that commercial determinants of health (CDoH) frameworks offer important guidance for addressing harms by informing upstream solutions that target critical business practices that create negative health impacts. Based on this framing, we recommend the adoption of a precautionary approach and outline a range of critical solutions that place responsibility for youth online safety on digital platforms through standard-driven and externally accountable systems of protection. We advocate that these strategies must involve multi-sectoral collaborations that are informed by the lived experiences of children, youth, and families.

Keywords Commercial determinants of health, Child and youth wellbeing, Policy, Online harms, Digital media, Risk factors

1 Introduction

Over the last 10–15 years, concerns regarding declining youth mental health have intensified. Within the scientific community, there has been ongoing debate regarding whether digital media is a contributing factor. Since there is already clear evidence whereby the activities of tech commercial actors influence the health and well-being of young people [1–4], we argue that hesitancy during ongoing attempts to address this research question is perpetuating significant harms impacting young people. Using the concept of the commercial determinants of health (CDoH), this perspective paper provides an overview of the key issues related to digital platforms and the pathways of influence on child and youth wellbeing. The CDoH have been defined as “the systems, practices, and pathways through which commercial actors drive health and equity” ([5], p. 1195). We begin by examining the range of mechanisms of influence related to digital



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industry that impact negatively on child and youth wellbeing. Further, we call attention to the business practices relating to tech commercial actors that perpetuate these interactions. We highlight the shortcomings of traditional scientific discourse that places the responsibility for mitigating harm on children, youth and their families and how this is contributing to the issue. We advocate for a precautionary approach and conclude with recommendations that can protect children and young people by restructuring the business practices of critical actors within the tech sector.

2 Digital platforms as a commercial determinant of health

The focus of this paper is on ‘digital platforms’ as online media that is implicated in the attention economy, whereby we consider commerce that is driven through the commodification of human attention to drive profit, often through user-generated content. In this definition, we include digital platforms that may not always fall under the umbrella of traditional social media apps, such as TikTok or Instagram, but are associated with similar harms and often have integrated online social forums, user-generated content and, algorithms to drive engagement [6–8]. Examples include video-sharing platforms (e.g. YouTube), online games (e.g. Fortnite or Roblox) and AI chatbots (e.g. Replika), among others. In particular, we examine the practices of powerful multi-national corporations that are implicated in these harms, sometimes described as Big Tech. The most notable actors include multinational digital platforms, such as Meta and Alphabet (see [9–12]). We would also like to call attention to companies, such as Apple and Amazon, that may not be directly involved in the management of digital platforms, but are closely implicated in related profit generation and health harms.

We review research within two main areas: (1) the multiple dimensions of digital harms experienced by children and young people and (2) the CDoH, including literature that examine digital platforms through this framework. These two frames informed the synthesis of the literature and organization of the report. Recognizing that this field of research is experiencing rapid change, we examined peer-reviewed publications, policy documents, as well as media articles to capture evolving and current policy and legal issues. Recommendations compiled were initially centered on policy solutions, but evolved to integrate more collective and comprehensive approaches.

Childhood and adolescence are widely recognized as periods of continued brain development, whereby executive functioning, critical thinking and the ability to self-regulate are still involved in maturation [3, 13–15]. In addition, the adolescent stage of development is characterized by increased risk-taking, impulsivity, sensitivity to peers, social rewards and media influence. These traits predispose children and youth to greater harms from digital platforms, including vulnerability to fake news and risk of sexual exploitation [14, 16]. We argue that these risks are particularly salient for children and youth between the ages of 8–25, beginning when many children are able to read and navigate the online world independently, spanning the age range where they have not yet reached full brain development. However, we also argue that younger children experience exposure to negative impacts through screen use, and many of the harms experienced by young people are relevant to older age groups.

The impacts of digital platforms are complex with bidirectional effects producing variable impacts on diverse young people [17–19]. We highlight six separate domains related to: (1) Digital addiction, (2) Digital platforms as a vector for health-harming industries,

(3) Influences on development, (4) Body image and eating disorders, (5) Misinformation, cyberbullying and hate, and (6) Sexual exploitation, self-harm and suicide.

Platforms act as drivers of health resulting from their design and exacerbate the impact of other industries through their advertising affordances, targeting and data capitalism (see [20, 21]). It is also important to recognize that digital platforms themselves, can be recognized as an unhealthy commodity when they integrate specific design features that drive addiction (see [22–25] for elaboration of addictive nature). Design features create secondary harms related to development, self-image, misinformation, and self-harm, as vulnerabilities are exploited to draw user attention. These features also increase the likelihood of additional harms from third party actors, such as sexual exploitation, cyberbullying and hate groups, through increased exposure. Beyond explicit harms proliferated by platforms as an unhealthy commodity, there is an additional range of business practices adopted by Big Tech that create broader power imbalances and economic inequities. Technofeudalism is a distinct mechanism through which digital platforms contribute to inequities. This concept describes the creation of economic systems whereby dependencies are established through the development of digital infrastructure and extraction of monopoly rents [12].

2.1 Digital addiction

With recent advances to machine learning, innovations that take advantage of human tendencies to become easily bored and to be attracted to social cues have increased dramatically. Algorithms are technical processes that sort content to drive user engagement for profit (see [26]). They are known to elicit addictive behaviours and can be used to drive users into rabbit holes that expose them to harmful content that promotes polarization, hate and self-harm [3, 27, 28].

Global prevalence of digital addiction has been increasing over the last 20 years [22] and prevalence of problematic social media use in children and young people has increased from 7 to 11% over the last 4 years [7] with the highest prevalence of problematic gaming observed in 11-year-old boys at 14%. It is also important to consider the amount of time spent on a screen and the displacement of other healthy activities, including socializing with loved ones, managing household responsibilities, extracurricular activities, studying or learning new skills, gaining work experience, volunteering, and performing health hygiene behaviours, such as sleeping or being physically active, among others. This, by itself, is cause for concern if young people are spending upwards of 5–7 h of their free time on screens [29, 30].

The tech industry practice that is most strongly implicated in problematic screen use behaviours is digital or surveillance capitalism whereby business models are premised on the accumulation of mass amounts of behavioural data that is then used to increase user engagement and support targeted marketing (see [11]). These platforms serve as conduits for exchange for other markets, developing into monopolies that eventually become “entrenched as part of societal infrastructures, producing dependencies that further locks in individuals and institutions” ([12], p. 242).

Business models that structure profit as contingent on digital user engagement and behaviour prediction are the central driver of a multitude of derivative harms. For example, TikTok’s main objective is to increase active daily users measured by retention and time spent on the app [31] and internal research has identified that users can become

addicted to the platform in less than an hour and that this is associated with negative impacts on functioning, mental health and human connections [24, 32]. Features that are meant to drive user engagement are now being integrated into AI companion technologies that are designed to simulate relationships and offer emotional support, such as Replika. Exploiting our need for social connection may be even more pernicious, particularly for those who are already socially isolated.

2.2 Digital platforms as a vector for health-harming industries

Digital platforms serve as a conduit for other industries, such as alcohol, tobacco and sugar-sweetened drinks [20, 21], despite recommendations to restrict marketing of these products to young people [33]. These practices are exacerbated by the selling and use of personal data from children. In 2022, the annual revenue derived from advertising targeting children and youth, alone, was found to generate \$11 billion in revenue across six popular social media platforms [34]. A recent analysis found that 8% of Apple apps and 7% of Google apps were designed to target children [35]. Among these platforms, personal data, such as IP address and GPS location, were 42% more likely to be shared with advertisement companies in comparison with apps targeted at older audiences [35]. The unboxing videos that proliferated on YouTube and the more recent emergence of kidfluencers are other notable examples of exploitative digital marketing to young people [36].

2.3 Influences on development

Research increasingly shows that online media use is linked to long-term brain development. Studies with younger children have identified that tablet use is associated with decreased ability to regulate emotions [17, 18]. In young people who exhibit habitual checking of social media, neural development is altered in brain regions associated with motivation, emotion and self-regulation with possible negative psychological consequences [37]. In another longitudinal study, researchers identified that there was a substantial negative bidirectional relationship between social media use and life satisfaction that was most pronounced in adolescence [38]. Smartphone use and screen time has been negatively associated with lower achievement scores in literacy and math, and poor educational outcomes [39, 40].

2.4 Body image and eating disorders

Evidence regarding the relationship between social media and eating disorders has been accumulating over the past few decades. Findings date back to the late-1990s pro-anorexia sites that promoted ED behaviours, unsafe weight loss, and misinformation [41]. With the expansion of social media platforms, similar content has proliferated. ‘WhatIeatinaday’ content romanticizes competitively restrictive diets and unrealistic beauty ideals. Adolescent girls tend to be most affected, with a number of social media accounts associated with higher reports of ED-related symptoms [42]. Time spent on social media use has been linked to greater odds of over-evaluation of body image, disordered eating behaviours, and related distress [43]. Looksmaxxing is a more recent social media trend impacting males that includes a range of harmful practices such as caloric restriction, cosmetic surgery and bone smashing [44].

Eating disorder prevalence and severity intensified significantly during the pandemic [45]. In Canada, hospitalizations related to eating disorders increased by approximately

60% in the 2 years following the onset of the pandemic, with the largest increases observed among young people [46]. This coincided with increased use of digital platforms during the pandemic and there is a general consensus that this was a contributing factor [47]. During this time, digital industry had been aware of their role. In a highly publicized whistleblower story, an ex-employee of Facebook shared internal documents confirming that the company knew that Instagram was exacerbating body image issues for young females, with 17% reporting that Instagram made their EDs worse [10]. In spite of this information, *they elected not to address it* [48].

2.5 Mis/disinformation, cyberbullying and hate

As a corollary of mechanisms driving user engagement, misinformation, polarizing content and rage bait have become integral features of the digital landscape. Neoliberal ideologies created the conditions for the spread of misinformation [49] and with the emergence of generative AI, creating and spreading false information has intensified.

Misinformation has caused severe health impacts. For example, it has been used to influence voter perceptions, amplify the spread of propaganda campaigns to drive conflict and to motivate ethnic cleansing [50–52]. During the pandemic, misinformation spread quickly, prompting the World Health Organization, along with partners, to issue a joint statement warning of the harms related to digital misinformation [53]. Notably, Facebook delayed a commitment to banning vaccine misinformation until 7 months into the pandemic which contributed to substantial additional deaths [54]. Recognizing that digital platforms profit from the spread of misinformation, it is concerning that these organizations are now partnering with health institutions to address misinformation. A recent example is the collaboration between TikTok and the WHO in a campaign to promote health literacy and combat misinformation [55].

Mis- and dis-information has proliferated hate speech, which has led to racism, misogyny and other forms of aggression. An examination of Facebook's 2018 hate speech policy identified that only approximately half of reported content was removed [56] and according to internal monitoring, this percentage is much lower [10]. Digital platforms have exhibited a general lack of transparency as well as active opposition to remove hateful content [10, 56, 57].

As an extension of these emotionally charged interactions, and exacerbated by low social accountability, cyberbullying has become another critical harm affecting young people. Social networking sites have provided perpetrators easy access to a large audience at any time, and anonymity has enabled perpetrators to escape accountability. Greater engagement on social media has been associated with higher risk of victimization and perpetration [58]. Cyberbullying victimization and perpetration are associated with health, behavioral and psychological problems among youth, including suicidal ideation and attempts [59, 60].

2.6 Sexual exploitation, self-harm and suicide

Online child sexual exploitation affects up to 30% of children [16, 61, 62]. However, many young people do not report, therefore actual prevalence is likely higher [16, 62]. Sex-tortion targeted at children and youth has been proliferating [63]. Whistleblowers have testified that Meta staff were instructed to destroy internal documentation of product

risk of sexual abuse [64] and that leadership ignored and misrepresented the harms that children experience on their platforms [65].

Rates of self-harm in young people have been increasing, with emerging evidence suggesting that exposure to self-harm content may normalize this behaviour as a coping strategy [2, 66]. Online risk factors increase suicide-related behaviour in young people, with exposure to five or more factors increasing risk exponentially [67]. Online exposures to harmful content have led to many young people dying by suicide. These are exposures and trauma that could be prevented through the creation of critical protections.

2.7 Inequities related to digital media

It is of critical importance to recognize that online harms result in increasing health inequities, whereby negative impacts are experienced more intensely by young people who are already marginalized [14, 17, 18, 68]. This must be considered as a critical caveat when evaluating the benefits for some. Algorithmic content amplifies any challenges young people are grappling with, including difficulties related to self-regulation, social isolation, mental health challenges or other vulnerabilities, and leverages these to reinforce potential harm [28].

Cyberbullying disproportionately targets minoritized youth [72–77]. Not only is it more frequent, it is often more severe [78] and leads to greater harm (e.g. [79–82]). 2SLGBTQ+ youth are more likely to experience sexual harassment online and are at higher risk of online harassment from strangers [83, 84]. Sexist narratives have been promoted by misogynist influencers that engender radical views and the perpetration of harassment [85, 86]. These attitudes permeate into social norms within classrooms and other environments. Targeted violence reinforces existing power hierarchies and systemic racism, sexism/cissexism, and heteronormativity.

Digital colonialism, whereby multinational tech companies take advantage of jurisdictions with less established worker protections and industry standards, has established monopolies across the Global South to support resource extraction, targeted surveillance, dominate political views and social norms, and create cultural hegemony [87, 88]. Human rights abuses have also been perpetuated through the more recent content moderation departments that subject workers to traumatizing content [87].

Although there continues to be a substantial collective voice arguing that we do not have sufficient evidence demonstrating social media harms (see [89–92]), we argue that, in light of existing evidence, we must apply a precautionary approach. This has been substantiated by multiple advisories and position statements highlighting an increasing recognition of the need to mitigate the youth mental health crisis [1, 93–97].

3 Implicated business practices of platform firms

We suggest that solutions must recognize digital platforms within the frame of the CDoH. Over the last decades, power imbalances have been created by powerful individuals and large corporations promoting a movement prioritizing free market competition and economic growth [5]. This has allowed industry (and in particular transnational corporations) to create favourable conditions for their business interests which may not be compatible with public health goals, and then externalize health costs to governments, further increasing power imbalances and health inequities. A recent Lancet

series highlighted seven key areas of commercial sector practice that are implicated in driving health inequities [5, 98, 99]. Commercial entities differ in how they engage in each of these practices and this mediates their influence on health, including positive, neutral or negative impacts. From this series, Lacy-Nichols and colleagues [99] offer a framework that is designed to analyze commercial entity practice to better understand corporate influence on health. Applying the framework developed by Lacy-Nichols and colleagues [99] to the main actors from Big Tech, we find that they are implicated in each category (see Table 1).

Table 1 Categories from Lacy-Nichols and colleagues [99] framework applied to the business practices of Big Tech

Commercial sector practices	Questions to guide analyses	Substantiating information that implicates Big Tech influence on health
Marketing	Practices to promote sales of products or services	Marketing strategies are supported by machine learning and algorithms [105, 3, 2, 1, 107, 27, 71]. Targeted marketing practices to vulnerable individuals [19–21, 3, 71, 34]
Supply chain and waste	Practices involved in the creation, distribution, retail, and waste management of products or services	Negative environmental impacts from resource extraction [87]
Financial	Practices to support financial position of the organisation	Massive revenue accumulated by Big Tech with earnings often greater than the gross domestic product of many countries [71, 87]. Many organizations pursue monopoly control [87, 88, 39]. Tax evasion [136–138]. Technofeudalism [12]
Geographical Range	Countries where the entity engages in any of the seven practices	Organizations are predominantly multi-national and take advantage of varying jurisdictional standards to their benefit [87, 88]
Labour and Employment	Practices to manage those employed directly within or under contract to the organisation within its supply chain	Multinational tech companies take advantage of jurisdictions with less established worker protections and industry standards to establish monopolies across the Global South to support resource extraction, targeted surveillance, the influence of political views and social norms, and the creation of cultural hegemony [87, 88]
Reputational Management	Efforts to shape legitimacy and credibility, reduce risk, and enhance corporate brand image	Significant investment in public relations and corporate social responsibility strategies to manage reputation with respect to harms [27, 105]. Very high influence through digital and social media channels
Ownership and control	Ownership and organisational structure of the entity	Tech companies protected by section 230 and the first amendment resulting in very limited liability [3, 27, 87, 107]
Transparency and disclosure	Breadth and depth of information provided by the entity	Tech companies actively oppose the transparent sharing of data [1, 3, 27, 87]. Low quality data is offered to external academics [27] and possible harms are actively hidden [3, 27, 107]
Products	All goods and services produced	Harm generated through digital platforms or through exposure to other harmful products [1, 2, 3, 7, 17, 18, 20, 21, 27, 55, 66, 71, 95, 107, 125]
Political	Practices to secure preferential treatment, prevent or favourably shape policies, and circumvent or undermine policies	Tech organizations invest significant efforts to influence policy development [27, 87], including through lobbying [3, 87] litigation [3, 107] and by undermining the democratic process [50, 87, 105, 125]
Scientific	Practices involving the production and use of science to alter products or otherwise secure industry-favourable outcomes, or both	Tech industry influencing scientific practice to increase sales [93, 125], through investments [27, 71, 105] and the influence of research direction [27, 71, 105]. Conflicts of interest declarations and/or consultation roles related to tech industry on publications presenting neutral or positive influence of social media (see [89, 109, 110])

3.1 Shortcomings of the scientific evidence related to digital harms

One of the major challenges that has slowed progress in addressing online harms is the over-reliance on more traditional scientific approaches informed by the biomedical model [98]. Aggregate analyses cannot take account of differential impacts that vary based on individual characteristics [19, 100] and mechanisms of influence are complex [67]. There are several criticisms of studies that contribute to this issue (see [101, 102]). Harmful norms extend beyond the screen and impact young people, regardless of their usage patterns [86, 103]. Another challenge is that digital platforms are constantly evolving [49]. The emergence of machine learning has accelerated this evolution [104] and *it is not clear whether there will ever be the perfect data that is typically expected within the scientific community to make definitive conclusions.*

Similar to tactics employed by Big Tobacco, platform firms have contested evidence against their interests to avoid regulatory intervention, taking the position that stronger evidence is necessary before any action is taken (see [105]). Some of the major criticisms of the existing evidence regarding social media harms indicate that studies are primarily cross-sectional and rely on self-report (see [89–91, 106]). However, investigations are hindered because tech companies are known to resist sharing data, often using legal action (see [3, 34, 107]). Tech companies enforce strict regulation of internal data, including control of who is given permission to access the data, as well as what content is available to them. They do not permit scraping outside of their own tools and have removed researcher accounts to limit attempts to examine content related to misinformation [27]. These practices will inevitably influence the credibility of findings.

It is not yet widely recognized that industry can influence the scientific evidence through partnerships. International organizations [108] and researchers [90, 91] continue to recommend collaboration with industry as a promising solution. It is unclear how substantially digital platform companies have influenced the overall research findings related to child and youth mental health. However, we identified several published studies that presented positive or neutral findings related to the association between digital platforms and mental health (as well as recommendations to partner with, and not to impose regulations on industry) with reported conflicts of interest and/or consultation roles related to the tech industry (see [89, 90, 109, 110]). This issue has also been described by Daszkiewicz and Tennant [101].

3.2 Shifting the responsibility onto children and parents

Finally, we would like to call attention to the prevailing scientific narrative that argues for recommendations that place the responsibility, and correspondingly, societal perception of blame, on those individuals with significantly less power, resources and influence than large corporations (in this case, children, youth and their families) rather than through policy action that can prevent harms and reduce health inequities [111]. Shifting the responsibility for mitigating harms onto the consumer is a known strategy employed by health-harming industries, including digital platforms firms. One example is the campaign launched by Google advising parents that “Sometimes the best YouTube is less YouTube” [112]. These advertisements began to make regular appearances across Ontario, concurrent with the launch of multiple school board lawsuits against digital platforms [113].

For children and younger adolescents, the responsibility has often fallen on parents and caregivers to limit online exposure. Learning about best practices to limit screen time is not sufficient to support parents in mitigating their children's exposure. With the closure of schools and daycares, the pandemic placed a significant care burden on mothers and families, and many were forced to cope through the use of additional screen time. Correspondingly, child and youth screen time increased dramatically [29, 30]. Despite the easing of restrictions, many of these habits have continued, indicating that norms related to screen use have persisted [114, 115]. These screen-based devices are now an integral part of everyday functioning and require constant management. Addictive behavior is hard to limit when the source of addiction is embedded within every space where children spend time—home, school, and with peers.

There are also known examples where industry has used collaborations with the education system to influence social norms and youth behaviour to promote corporate interests [116]. Google is now replicating this practice through partnerships with public school boards. Many children have been assigned Chromebooks through Canadian schools and their classroom content is managed in Google Classroom. Parents are not granted administrative control for the Chromebooks, therefore, they are unable to limit access to YouTube while their child is studying. Consequently, students must deal with the constant algorithmic distraction of YouTube and YouTube Shorts every time they access their devices for schoolwork. YouTube is, by far, the most popular platform for the youngest users [117]. The navigation of parental controls is a critical shortcoming in the current system and this creates constant challenges for parents trying to mitigate harms.

Another issue to consider is that social platforms are attractive to young people because their friends are there. Limiting access to these social interactions is likely perceived as an unreasonable restriction of freedom, particularly for this age group. For parents, it is very likely not the intention to cut their children off from their peers and social supports. Rather, it is the myriad entanglements that are designed to draw them away from their true social connections once they enter these digital spaces and into an unpredictable spectrum of risks. Inevitably, when parents place restrictions on access to these spaces, it creates confrontation. Conflict between parents and children itself can contribute to poor mental health [118]. A recent survey of Canadian families identified that 85% of parents were in conflict with their teens with respect to their technology use and that this conflict was impacting their whole family negatively [119]. Parents are left to decide between two options that may impact negatively on their child and family.

This is consistent with recent evidence. In the U.S., 70% of parents feel that parenting has become more difficult over the last 20 years, with a majority stating that they worry about their child's exposure to social media [96] and the top two parental concerns were overuse of digital devices or screen time (67%) and social media (66%) [120]. These findings suggest that many parents are highly aware of the risks related to digital platforms and despite their best efforts, are unable to manage these concerns. "The entire burden of mitigating the risk of harm of social media cannot be placed on the shoulders of children and parents" [2, 21].

Table 2 Recommendations for policy, practice and research to mitigate online harms

Recommendations for policy and practice focused on digital environments	• Apply general recommendations from CDoH frameworks to inform policy and practice • Recognize industry actors as key targets in policy development and prioritize upstream strategies rather than focusing primarily on downstream individual perpetrators • Apply the UNCRC General comment No. 25 when developing policy and practice related to digital environments • Regulate industry to enforce transparent data sharing with a broad range of independent researchers, users and the public • Mandate independent algorithm audits • Restructure digital business practices that rely on the collection of user data and behavioural manipulation to increase platform engagement
Recommendations for future research	• Integrate the concept of the CDoH in future research examining online harms • Conduct interdisciplinary research and interventions to take account of complexity in collaboration with policymakers • Conduct additional research within low- and middle-income contexts that take account of social, cultural and economic factors that influence online safety • Examine individual tech companies using CDoH frameworks to explore differential contributions from each organization • Engage children, youth and families to inform future directions in research, practice and policy

4 Solutions and recommendations

Based on this framing, we argue that there is a critical need to develop policy and practice solutions that target the business practices of critical commercial actors within digital spaces. We summarize our recommendations in Table 2. Overall, it is critical to maintain a focus on upstream solutions in order to address online harms. The root cause perpetuating online harms is the profit-driven mechanisms linked to the operation of digital platforms – solutions must take account of these structures. The CDoH framing should facilitate the prioritization of upstream solutions and dissuade strategies that place the responsibility on children and families.

Applying the CDOH framework alone may be overly paternalistic and risks the exclusion of individual rights and needs. Integrating a child rights lens, as a complementary approach alongside the CDoH framework, can address this limitation. This lens holds participation and protection as central and it advances the integration of child, youth and family perspectives to strengthen solutions and improve impact. Relatedly, children’s rights advocates have been leaders in this area. The U. N. Committee on the Rights of the Child General comment No. 25 [4] outline a range of key considerations with respect to children’s rights within the digital context. In addition to recognizing the responsibilities of the business sector and the need for comprehensive regulation to protect children’s rights, they also highlight the importance of equitable access to information, healthcare, culture and education.

Fundamental rights of the child include the right for children to express themselves and the right to be heard [121]. This aligns with the practice of engaging children, youth and their families in order to integrate their lived experience to inform research, practice and policy that affects them. Supporting individuals with firsthand lived experience of the digital world and related social norms offers critical insight into the nature of these phenomena. Their participation will be necessary to inform feasible and effective solutions to create healthy online environments.

Collaborative partnerships are essential as these issues cannot be addressed by working in disciplinary silos. Strategies should include social mobilization through advocacy from across stakeholders, including health and civil organizations, journalists, academics and the public [98]. A critical step in supporting this mobilization will be in challenging

neoliberal assumptions that constrain our efforts to downstream interventions [111]. Strengthening upstream efforts across disciplines and sectors through capacity-building to support greater understanding of the commercial and structural determinants of health, as well as opportunities to expand existing efforts will enhance collective action and increased impact [122, 123]. Important future avenues relate to the regulation of platform design and in particular, algorithmic architecture. Independent algorithm risk audits have been offered as a possible solution [3, 139, 140]. In terms of legal and policy precedent, there have been two considerable obstacles that have hindered progress in the regulation of digital platforms up to this point: (1) the First Amendment and (2) section 230 of the federal Communications Decency Act. The First Amendment offers protection of free speech (with the exclusion of illegal acts) and section 230 protects digital industry from liability related to harmful user content. There have been promising new developments in terms of recent legal cases where harms related to design features are placed as the central argument [9]. This may serve to advance policy efforts in this area dramatically, similar to historical class action suits against Big Tobacco (see [124]).

Interventions that facilitate a transition away from surveillance capitalism should be prioritized. These practices have unsustainable negative impacts on our social fabric and there is emerging agreement that it is necessary to pursue alternatives to these business strategies [12, 125–127]. “A new paradigm is needed in IT development that is no longer driven by the need to generate high profits through collecting large amounts of personal data and manipulating behavior, but is oriented to serve human needs while staying within planetary boundaries” ([127], p. 84). Possible opportunities include do-not-track legislation, reformulation of informed consent standards and the development of systems that facilitate interoperability to dissuade monopolistic control [127]. Multi-level restructuring that moves economic systems away from business models grounded in driving user engagement should be a foundational component of future directions.

4.1 Future research and the importance of integrating youth voice

Future research should integrate the concept of the CDoH and design interdisciplinary research that takes account of complexity. For example, researchers have highlighted that the impacts of digital platforms are complex and have bidirectional effects with variable influence on diverse young people [17–19, 70]. Realist reviews may be beneficial to capture a more comprehensive understanding of the mechanisms of influence related to digital platforms and youth wellbeing. There is a need for additional exploration of how the digital market drives the production of misinformation, the development of alternative business strategies that are not contingent on user engagement, and best practices to support governance of the digital market.

In terms of surveillance capitalism, it is important to note that there is a lack of evidence substantiating the effectiveness of targeted advertising with respect to actual profits generated. Törnberg [12] suggests that narratives driven by hype are a major contributor to the speculative investments and accumulation of power within monopoly platforms, and recommends that researchers apply a critical analysis of the narratives surrounding platforms’ ascendance to power in order to interrogate their legitimacy. This may be a critical contribution to justify a movement toward alternative business models.

Children, youth and families should inform future directions in research, practice and policy. In particular, there is a critical need for more studies that examine the lived experience of parents and families attempting to mitigate exposure to screens to identify feasible solutions. These findings will bring greater insight into their lived experience and will enhance design of research and intervention to support stronger impact. It is unsurprising that it is often parents who are leading advocacy efforts. They have the greatest personal stake: their children.

These efforts will benefit from taking a multi-level approach to youth engagement that includes broader consultation, as well as youth involvement in leadership. We argue that youth advocates taking leadership roles within policy and complex public health initiatives must also be supported in developing critical health literacy in order to meaningfully engage in decision-making processes [111, 128].

Researchers have begun to examine youth perspectives related to the CDoH and health-harming industry practice [130, 131] and they advocate for the inclusion of young people in public health initiatives designed to address industry-related harms [131]. We recommend the application of a multi-level approach that allows for a range of opportunities for involvement and mentorship (see [128]). As youth capacity and interest develops, scaffolded opportunities can facilitate increased involvement. Youth in leadership roles partner with decision-makers and support design and implementation of the overall project. Through these efforts, youth develop a strong understanding of the CDoH and the nature of interventions designed to create population-level health equity. This approach enhances understanding of broad child, youth and family experiences, while integrating their perspective within critical dialogue.

As new policy interventions are implemented, there will be a need for comprehensive evaluations of these efforts that take complexity into account (see [129, 132–134]). Policy mapping and analysis will also contribute valuable insight to the collective work being implemented across the world (see [135]). This evidence will be critical in informing a better understanding of how to address these issues effectively as well as to support scaling of efforts.

5 Conclusion

In this perspective paper, we offer a critical analysis of key issues related to the influence of digital platforms on child and youth wellbeing to present an argument for upstream solutions informed by the CDoH framework. Current efforts have relied on traditional scientific practices that offer reductionist interpretations of critical issues and ineffective solutions. We call for a re-framing of the key issues affecting child and youth wellbeing by highlighting the complexity of the relationship between digital platforms and health, the critical challenges delaying progress to address harms created by digital industry and the most promising ways forward. In our hesitation to regulate the business practices of digital platforms that contribute to health inequities, we are failing our children and young people. We appeal to researchers, policy-makers, practitioners and all who hope to create a better world for young people, to stand together in these efforts, for our collective future.

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Author contributions

TH made substantial contributions to the conception of the work, acquisition of the literature, analysis and interpretation of the work, drafted and revised the manuscript. AH, ZA, MJ and AB made substantial contributions to the conception of the work and acquisition of the literature. NK, IT and NO made substantial contributions to the acquisition of the literature, analysis, and drafting of the manuscript. MC and MZ made substantial contributions to the analysis and reviewed the manuscript critically for important intellectual content. All authors reviewed the manuscript, offered critical feedback, approved the final submitted version and agree to be accountable for all aspects of the work.

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The authors declare no competing interests.

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